THE IRON TRADE REVIEW

VOL. XXXI. CLEVELAND, O. NOVEMBER 24, 1898. CHICAGO, ILL. NUMBER 47

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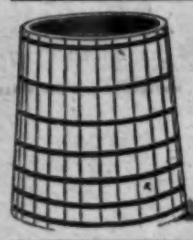

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THE IRON TRADE REVIEW

VOLUME XXXI. CLEVELAND, O. NOVEMBER 24, 1898. CHICAGO, ILL. NUMBER 47

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The failure of the steel rail manufacturers to agree on a selling arrangement or to fix prices for 1899 is the important development of the past week. The next step is still undetermined. The possibility of some division of Central and Western business between Pittsburg and Chicago is reported to be still under consideration and a meeting will be held at Chicago on Friday. It is reported that an agreement on girder rails is well under way. In the trade at large there are two views of the disagreement. That it will mean a larger volume of rail buying there is no doubt; and from this standpoint, as well as from that of the steel trade in general, which prefers to see rail mills busy on rails and out of the billet field, the tonnage consideration is paramount. That the benefit of an agreed advance in rails, both to rail and other mills, would more than balance the business cut off by a higher price, is another view; but there is room for question. It is known that a number of railroads are ready to contract for 1899 and that the amount of their purchases will be less if the price is put higher. With the business they will carry over into next year, the mills are certain to be well provided for in 1899. It is a question, however, if an open market on rails will help a bull campaign in the listed stocks of a rail-making company. Beyond its general confidence that the railroads will be heavy buyers next year, both of rails and equipment, and that there will be the added momentum of the prosperity now visible in all directions, the iron trade has not strongly committed itself for the new year. The Bessemer pig iron and billet markets are sentimentally strengthened by the prospect of no restriction on rail tonnage; for steel works not makers of rails will have less competition, with less dragging of prices for steel and for all products that begin with the billet. The Bessemer pig iron association had its first meeting in weeks on Tuesday, and a canvass of the situation revealed greater strength than had been indicated by some recent market rumors. Furnacemen, it is reported, are not parting with their iron at the figures recently made on small outside transactions. Delivered prices now quoted are equivalent to $9.65 to $10 valley furnace. The billet market is quiet at $15.10 to $15.25 maker's mill. Tin plate bars are in an unsettled state in view of the tin plate deal. The quotation is $16.25 to $16.50, with a firmer tendency. The Southern iron masters are still refusing business offered at prices below their quotation and the Birmingham district continues to book export orders at the rate of more than 1,000 tons a day, the leading concern having entered 20,000 tons since Nov. 1. The freight question is still serious, however, and rates promise to rule strong for the next few months. This must continue to restrict foreign business and is a factor to be reckoned with in calculating the course of prices at home. The chance of complications still ensuing in connection with the National expansion policy is not to be overlooked. Inside the trade the question to be settled, so far as foundry iron is concerned, is how far the expansion of the business of gray iron foundries noticed this year, is to continue. If it is merely the postponed needs of the few years of under-consumption immediately preceding, it will not last. The past week has seen more liberal buying of foundry irons in the Chicago district, Northern and Southern irons sharing the business; in the Central West there has been a good movement, confined almost entirely to Norhern irons. Consumers who buy a year's supply are now paying practically the price at which they contracted a year ago, in the case of Northern irons, and to such buyers the advance from the lower prices of the early months of this year is not appreciable. Car orders are even a stronger factor in the finished material market than in the past few months, particularly in the West and Central West. If the general car scarcity is any criterion, this business for the next year should be enormous. The tin plate consolidation is practically an accomplished fact, as noted in detail eleswhere.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.* }
705 PUBLICATION BUILDING, NOV. 23. }

The general iron and steel market is without decided change. Billets are still weak, plates are stronger, and the rail situation is not yet cleared up, though it is believed that little remains to be done as to fixing up an arrangement on girder rails. Export inquiry continues heavy. Little business is being done for next year, but indications are all in favor of a good year. The tin plate consolidation is settled, and spot tin plates are very firm.

PIG IRON.—There are conflicting reports regarding the status of the Bessemer pig iron market. A report is current in some quarters that the valley association is adhering to a $10 rate for its product, but the selling agency reports that the price of association iron is open to negotiation the same as the product of individual furnaces. A moderate turn-over has been made at $9.65 to $9.75. Rates as low as 45 cents from the valleys to Pittsburg are said to have been made, but in the absence of a strong demand, enough local iron has been on the market to prevent control of this market by Valley iron, and sales in Pittsburg have been made down to $10, which is rock bottom, $10.10 and $10.15 being usually quoted. Foundry iron is moving a trifle more freely, while mill iron is quotably higher in the face of better demand. We quote as follows:

Bessemer, valley furnace	$ 9.65 to $ 9.75
Bessemer, Pittsburg	10.10 to 10.15
No. 1 Foundry	10.50 to 10.60
No. 2 Foundry	10.00 to 10.25
No. 3 Foundry	9.65 to 9.85
Gray Forge, valley furnace	8.75 to 8.90
Gray Forge, Pittsburg	9.25 to 9.35

BILLETS AND RODS.—The steel billet market weakened appreciably the latter part of last week, several mills having received specifications rather slowly. To-day the situation has improved in this respect, and the market shows more indications of strength for next year's business. Wheeling steel mills are well fixed for the balance of the year and are quoting $15.10. At Pittsburg, $15.25, delivered, is about the best price obtained, and one or two interests, which are particularly well filled, are quoting $15.25 at mill. The new sheet and tin bar mill at New Castle was put into steady operation last Friday morning, and deliveries are being made right along. Uncertainty as to the stand to be taken by the tin plate consolidation, which is now an absolutely assured fact, is causing a nervous feeling in the sheet bar trade. Prices are unchanged at $16.25 to $16.50 for cut bars. The rod situation is a trifle better, a Western mill being temporarily broken down. Quotations are $20.50 to $20.75, though the former figure might be shaded a trifle.

PLATES.—There has been a rush to get plates, which are scarce for prompt delivery, and quotations have been affected. The outlook is favorable. Tank has again advanced, and 1.15c could scarcely be shaded. We quote: tank, 1.15c; shell steel, 1.20c; flange, 1.25c; fire box, 2c and upwards.

RAILS AND TRACK MATERIAL.—The rail negotiations were suddenly interrupted last Friday, but have been resumed. A meeting will be held in Chicago next Friday, at which all interests will be represented. Quotations on girder rails have been withdrawn, and it is believed that in this line at least an agreement will be consummated, while on T rails it is questionable what can be done. The demand for track materials continues good, the following prices being quoted: Spikes, 1.45c; track bolts, 1.65c to 1.70c; splice bars, 1.10c to 1.15c; links and pins are quoted from 1.20c to 1.27½c.

PIPES AND TUBES.—The market is a trifle stronger. The leading interest is fully sold into next year, and other mills are comfortably filled with orders. The Middletown interest has taken a contract to supply a considerable quantity of special pipe to drain the 15 mines of the Comstock lode in Nevada. Prices remain unchanged, with additional discounts six tens for less than carload lots, and six tens and five for car loads. Base discounts are: Butt weld, black, 55 per cent off; lap weld, black, 65 per cent off; butt weld, galvanized, 47½ per cent off; lap weld, galvanized 52½ per cent off. Discounts on merchant boiler tubes are as follows: 2¼-inch and smaller 72½ per cent off; 2½ inch and larger, 75 per cent off. Inserted joint casing is now quoted at 60 off and screw and socket joint casing at 60 and 10 per cent off.

STRUCTURAL MATERIAL.—The demand is slightly checked by the advance of the season, but export business remains good, though of comparatively smaller volume than domestic. Prices remain: Beams and channels, 3 to 15 inches, 1.20c; 18 to 24 inches, 1.30c; tees, 1.25c; zees, 1.20c and angles, 1.10c. Universal plates are generally quoted at 1.10c but some firms are holding for 1.15c and are getting business.

SHEETS.—The market for black sheets is a trifle weaker. Quotations for this year's delivery are 1.90c for No. 28, but some few mills are shading this price. Others, which are well filled, are quoting higher. The usual quotation for first quarter next year is 1.95c, at which price buyers are not taking hold. Owing to the continuance of the advance in spelter, galvanized sheets are stronger, and 80 and 10 per cent, which was commonly quoted last week, is now only occasionally heard, the usual figure quoted being 80 and 7½ per cent.

SPELTER.—The spelter market is nervous and excited, and quotations have advanced to $5.32½.

FERRO-MANGANESE AND SPIEGEL.—Ferro-manganese continues to be quoted at $50 for 80 per cent domestic delivered, and spiegel at $23.50 and $24.

IRON AND STEEL SKELP.—But for a continuance of good demand from pipe mills and steel car works, skelp would show a more decided weakening this week. We now quote: Grooved iron skelp, 1.07½c to 1.10c; sheared iron skelp, 1.20c to 1.22½c; grooved steel skelp, .97½c to 1.05c; sheared steel skelp, 1.10c to 1.12½c.

OLD MATERIAL.—The market continues without change. Old steel rails are $9.50; old iron rails, $13.75; wrought iron scrap, $11.50, net valley; cast borings, $6; busheling scrap, $9, net; car wheels, $10.25, gross; cast scrap, $9, gross; iron axles, $6, net; steel axles, $12.50, gross; charcoal scrap, $10, gross; wrought turnings, $6.75, net, valley; old steel rails, $9.50 strong for long lengths; cut rails for remelting, $9.75 to $10.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, Nov. 23.

The market has been active in most branches, large sales of some grades of iron and steel having been made, with an excellent demand still unsatisfied. The market is as strong as it well could be, without an advance in prices, and many mill and furnace representatives seem to think higher prices cannot be far off. The steel rail situation is still unsettled, although it is definitely announced that a general pool of all the railmakers will not be formed. It is quite likely, however, that an arrangement will be entered into between the Illinois Steel Co. and the Carnegie Steel Co. for a division of territory between these two concerns, with an agreed price. It is stated that the head of the Pittsburg interest expressed unwillingness to have his concern tied up in such an arrangement and preferred to leave the field open, believing that if this is done the Carnegie company will secure a larger share of the tonnage placed than with a pooling arrangement which will put competing companies on an equal basis, so far as prices are concerned.

PIG IRON.—Considerable iron has been sold in this market in the past two weeks, one buyer, the Griffin Wheel Co., taking several thousand tons each of Northern and Southern irons. Besides this sale, two or three other round lots of iron were placed, and a considerable tonnage of small orders. The demand has increased very largely in the past two weeks, and gives indication of a good deal of iron to be bought within the next few weeks. Most of the buyers are placing comparatively small orders, but there are a few inquiries of larger size in the market. The market is exceedingly firm, and some furnaces have been unable to accept all the business offered them, at any price. Stocks at both local furnaces and those in the South are very small, and few furnaces can accept much business for anything like nearby delivery. Some grades it is almost impossible to buy for delivery earlier than after the first of the year. No changes have been made in quotations in the week.

Lake Sup. Charcoal	$11 50 @ $13 00	Southern Coke No. 3	$10 35 @ 10 60
Local Coke Fdy. No. 1	11 50 @ 12 00	Southern No. 1 Soft	10 85 @ 11 10
Local Coke Fdy. No. 2	11 00 @ 11 50	Southern No. 2 Soft	10 60 @ 10 85
Local Coke Fdy. No. 3	10 75 @ 11 00	Southern Silveries	11 25 @ 11 50
Local Scotch Fdy. No. 1	11 50 @ 12 00	Jackson Co. Silveries	12 50 @ 14 50
Local Scotch Fdy. No. 2	11 00 @ 11 50	Ohio Strong Softeners	12 00 @ 12 50
Local Scotch Fdy. No. 3	10 75 @ 11 00	Alabama Car Wheel	15 00 @ 16 00
Southern Coke No. 1	10 85 10	Malleable Bessemer	11 50 @ 12 00
Southern Coke No. 2	10 60 @ 10 85	Coke Bessemer	11 50 @ 12 00

BARS.—Business continues good and orders last week made a good aggregate. One or two of quite large size were closed in the week. The small order business foots up a good total and seems likely to continue good for some time. Among the business closed was one contract from a car works for 2,000 tons, placed with an Eastern mill. Prices are unchanged, and while large buyers secure lower figures than we quote, the general run of business is placed at about our quotations. Quotations are made at 1.05c to 1.10c for common iron, 1.10c to 1.20c for guaranteed iron and 1.15c to 1.20c for soft steel bars from strictly billet stock.

RAILS AND TRACK SUPPLIES.—No agreement has as yet been reached by the rail mills, and developments in the past week make it seem unlikely that any arrangement will be made which will include all the mills. It is said that the two largest rail makers will make a division of territory and an agreed price, but this remains to be seen. Meanwhile no prices are made on rails, although the railroad companies are getting more impatient to do business every day. Light rails have sold fairly well, and two or three quite large orders were closed last week. Prices on these are made at $20 to $21 and upwards. Other quotations are as follows: Steel splice bars, 1.15c to 1.25c; track bolts with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.55c to 1.60c.

BILLETS AND RODS.—The situation remains unchanged, with the local mills sold so far ahead as to be unable to take further business for anything like close delivery. No sales were made in this market last week. Billets are still quoted at $16.50, and rods at $22.50.

CAR ORDERS.—The Wisconsin Central is understood to have placed an order for 1,300 cars within the past ten days. No other large contracts have been placed, but the demand is very heavy, including 5,000 or more cars for the Pennsylvania system, 5,000 for the New York Central, and several thousand for other roads. Car material sells well, and good sales were made last week.

STUCTURAL MATERIAL.—While no large contracts were placed last week for buildings or bridges, the general run of business has made an excellent total. The week's business with one mill was larger than any other this fall, and is surprisingly large, considering the season of the year. The market is very firm, with no changes in prices. Quotations are as follows: Beams, 15 inch and under, 1.35c to 1.40c; 18-inch and over, 1.45c to 1.50c; angles, 1.25c to 1.30c; plates, 1.20c to 1.30c; tees, 1.40c to 1.45c; zees, 1.35c to 1.40c. Small lots from stock are quoted at ¼c to ½c higher.

PLATES.—The demand for plates is exceptionally heavy and mills find considerable difficulty in taking all the business offered. Several of the mills are out of the market and are refusing business. The tonnage placed in the week was good, and included several large contracts. Quotations are

made as follows: Tank plates, 1.20c to 1.30c; flange steel, 1.30c to 1.40c; firebox steel, 1.85c to 5c.

SHEETS.—The demand for black and galvanized sheets keeps up very satisfactorily. Sales last week were good and included one or two quite large orders. The market is firm at 2c to 2.05c for No. 28 black and 80 and 7½ per cent discount for galvanized.

MERCHANT STEEL.—Sales in the week have been very good. Several buyers placed contracts for round lots, and there are two or three good inquiries in the market still unsatisfied. The total tonnage placed was fully as large as that of the week previous. Quotations follow: Open-hearth spring, tire and machinery steel, 1.65c to 1.75c; smooth finished machinery steel, 1.60c to 1.70c; smooth finished tire, 1.50c to 1.60c; tool-steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—This branch of the market has been quiet, with small sales and little demand for any grades. There does not seem to be much likelihood of a betterment right away, although some dealers are exceedingly hopeful of the future, both as to business and prices. Dealers' selling prices are as follows:

Old iron rails, gross,	$12 50@$12 75	Axles, net	$14 25@$14 75
Old steel rails, long, gr.	10 50@ 11 00	Cast borings, net	4 25@ 4 50
Old steel rails, short	8 75@ 9 00	Wrought turnings, net	6 00@ 6 50
Old wheels, gross	11 00@ 11 40	Axle turnings, net	7 00@ 7 25
Railroad forge, net	11 50@ 12 00	Mixed steel, gross	7 45@ 7 50
Dealer's forge, net	10 00@ 10 50	Stove plates, net	5 75@ 6 00
No. 1 mill, net	7 50@ 8 00	Heavy melting stee, gr.	8 25@ 8 50
Heavy cast, net	8 50@ 9 00	Old iron splice b., net.	12 75@13 00
Malleable cast, net	8 00@ 8 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World.*
27 VINCENT ST., NOV. 23.

Iron ore shipments are growing less, and the ports at the head of Lake Superior are through but for a few straggling cargoes. Marquette is holding on, and Escanaba shipments are likely to continue to Dec. 1, and possibly longer unless severe weather should shut in at once. Operations at all underground properties on Lake Superior are to be on as large a scale the coming winter as the labor supply will permit. There is no return movement noticeable as yet, on the part of the labor that has gone out of iron mining in the past few years, and copper mining promises to be, as it has been of late, a strong competitor with iron ore for any floating contingent. So far as next year's prices on ore are concerned, it seems quite certain that higher labor cost, added to the expected strong demand, will bring some advance, particularly on non-Bessemers. It is believed an agreement on Mesabi ores is facilitated by the organization of the Federal Steel Co., and that the absence of the extra profit that would have been secured by an agreement on steel rails, will be an added incentive to a profitable price on the company's Mesabi ores.

PIG IRON.—The Bessemer furnacemen held a meeting in Cleveland on Tuesday, but it is reported that no change was made in the status. Reports indicate that the situation, as indicated by stock statistics, is firmer than for some time, and the prospects for considerable buying in the next two months are regarded good. Some iron outside the association has been offered here and there but it is stated that prices recently made on stray small lots cannot be duplicated now. With some furnaces $10 valley is still the asking price, but quotations on outside lots are reported at $9.65 to $9.85. Freight concessions are said to be less frequent than in the early fall, there is no uniformity yet. However the low rates cannot be counted on for 1899 deliveries. Sellers of foundry iron report considerable buying the last fortnight, with contracts running up to 500 and 600 tons for delivery in the first half of 1899. The common price is still $9.50 at furnace for No. 2. In a few instances 25 cents more is asked by furnaces especially well sold up; in other cases delivered prices would indicate a shade below $9.50 as the furnace price. There has been a good deal of quiet contracting by the foundries and more are expected to make their purchases next month. Little Southern iron, comparatively, has been taken recently owing to the very firm position of sellers. In forge iron some business has been done at $8.75 delivered at valley mill, 10 cents freight; other furnaces quote $8.75 at furnace. Southern forge is $9.90 delivered in the valley. We quote f. o. b. Cleveland:

Bessemer	10 40@10 55	Valley Scotch No. 1	$10 40@10 50
No. 1 Strong Foundry	10 40@10 65	Valley Scotch No. 2	10 15@10 40
No. 2 Strong Foundry	10 15@10 25	Gray Forge	9 40
No. 3 Foundry	9 65@ 9 90	Lake Superior Charcoal	11 50

FINISHED MATERIAL.—A steady run of orders is noted, but no large lots. There are under consideration two more vessels, by interests other than the Bessemer Steamship Co. but no contracts have been placed. Some local car business is being figured on also, involving considerable material. The condition of various products remains unchanged—sheets weak, except in the case of galvanized, which are held up by the high price of spelter. We quote No. 28 black sheets, from mill, at 1.95c to 1.97½c Cleveland. Plates for early delivery are firm at 1.15c to 1.20c Pittsburg. For later delivery prices named are 1.12½c to 1.15c Pittsburg. Bar mills in the valley have a good prospect for work in the early part of the new year, but no improvement in price is promised. We quote 95c at valley mill. Steel bars are quoted 95c Pittsburg and Cleveland. In the market for wire nails and wire the struggle for tonnage by the largest interest is making an impression on prices. Production is large. We quote wire nails at $1.30 Cleveland; smooth wire at $1.15 and barbed wire at $1.40 and $1.70.

OLD MATERIAL.—There has been some business in busheling scrap for valley mills, on a delivered basis of $8.75, net ton; wrought turnings bringing $7 net and borings, $6 net. We quote $13.75 and $14 for old iron rails, which are so scarce that the latter price is commonly held. Old steel rails are quoted $9.75 to $10.

CINCINNATI.

Nov. 22.

A local selling firm makes the following comment on the pig iron situation: "There has probably been a little better movement in Southern iron during the past week, although the increase in the tonnage of new orders is not material enough to be significant. As has been stated heretofore, the Southern iron masters are fully aware of the fact that Northern irons can be put into the greater part of the West at prices materially lower than theirs, yet as time goes on their position concerning the market is firm. They are getting more and more confirmed in their idea of the situation every day and believe that they are going to be able not only to hold present prices steady and sell iron in large quantities at these prices, but to do better and obtain an advance. Considerable trade offered during the past week at figures under the ruling prices. All such propositions were rejected without consideration. No compromise was offered in any case. It was pay our prices or go elsewhere. That was the one answer to all offers below their ideas of value. Judging from an iron seller's standpoint we are still consuming iron at as great a rate as ever. There has been no let-up in the demand for shipments on old orders, while the urgency of requests to anticipate shipments continues. The largest of all the concerns in the South has sold this month upwards of 20,000 tons of iron for export, an average of 1,000 tons a day. The company frankly admits that its domestic sales have been small in comparison, but it says there seems to be no end whatever to the demand from Europe." The business of the past week has been for the most part in lots below 500 tons, two or three 1,000-ton contracts being reported. The inadequacy of shipping facilities is still felt, and now and then foundries are discommoded by delay of shipments. We quote for cash f. o. b. Cincinnati: Southern Coke, No. 1 foundry, $10 to $10.25; No. 2, $9.75 to $10; No. 3, $9.25 to $9.50; No. 4 and gray forge, $8.75 to $9; mottled, $8.75 to $9; No. 1 soft, $10 to $10.25; No. 2, soft, $9.75 to $10; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Jackson Co., silvery, No. 1, $12 to $12.50; standard Georgia car wheel, $14.25 to $15.

Important Pittsburgh Consolidation.

Negotiations are almost concluded for a consolidation of the Leechburg Foundry & Machine Co., Pittsburg, and the Robinson-Rea Mfg. Co., Pittsburg. The former concern arranged recently to remove its plant from Leechburg to Homestead, at the same time enlarging it and adding a steel casting plant. If the consolidation is consummated, which seems highly probable, the Robinson-Rea plant, now located on the South Side, Pittsburg, will also be removed to Homestead. The new concern will be known as the Mesta Machine Co. and will manufacture sand and chilled rolls, rolling mills, iron and steel castings, machine molded gears and ingot molds. Before a move for the consolidation was made the Robinson-Rea Mfg. Co. had plans well under way for the addition of a steel casting plant to its works.

THE IRON TRADE REVIEW
AND
INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

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NOVEMBER 24, 1898.

THE TIN PLATE DEAL A CERTAINTY.

The tin plate consolidation is now an assured fact. Most of the details have been arranged, and nothing is left undone which could cause a miscarriage of the plans at the last moment. The papers have been prepared, ando ther arrangements made, for securing a New Jersey charter with about $20,000,000 preferred and $30,000,000 common stock, so that the charter can be issued promptly when the word is given. The corporate name now talked of is the United States Tin Plate Co. The transfer of plants will be made meantime, the owners turning them in to the Illinois Trust & Savings Co., of Chicago, and receiving receipts which the trust company will redeem in shares of the tin plate company when they are issued.

Probably 90 per cent of those who are selling out to the promoters are taking stock in exchange. The necessary cash capital has been subscribed, and inventories are being rapidly arranged for, of stocks on hand, such as scrap, raw materials, partly worked up product, and finished material, all of which is to be taken at current market rates, so that the properties may be turned in to the trust company at a very early date. The consolidated company will be in actual working order by the first of the new year.

It is the frank admission of well posted men that in similar deal has ever been consummated in the United States which was so perfect managed in all its details. The tin plate manufacturers were originally a unit in asking for cash for their plants; but in the most admirable manner they were convinced, at the conferences held in Pittsburg and elsewhere recently, that stock would be preferable, and it is now certain that the bulk will accept stock. The stock campaign has been managed with much adroitness. A coterie of brokers in Chicago, Pittsburg and New York has been bulling the market systematically. Telegraphic offers are being methodically sent to tin plate makers and others asking for stock at premiums as high as 20 per cent, and manufacturers who were in doubt as to the wisdom of accepting the stock at 100 are now loth to accept these offers at such a premium. Others, however, who were willing to sell, have investigated, and have found that the offers emanated from untrustworthy brokers, that the amounts were limited, and that there was generally attached a string in the way of a clause releasing the would-be buyer on the pretext of a prior purchase.

It is generally agreed that D. G. Reid, now treasurer of the American Tin Plate Co., Elwood, Ind., will be president. His only formidable opponent is W. T. Graham, president of the Ætna-Standard Iron & Steel Co., Bridgeport, O. The original intention of erecting plants for the manufacture of the consolidated company's tin bars, rolls, castings, etc., was given up some time ago, and it is now hoped that the bar supply can be controlled. The present bar makers are the Carnegie Steel Co., Ltd., Bellaire Steel Co., Ætna-Standard Iron & Steel Co., Ohio Steel Co., Illinois Steel Co., Midland Steel Co., Buhl Steel Co., Shenango Valley Steel Co., and King, Gilbert & Warner. All of these can make bars, and a number of others could readily arrange to do so. The St. Louis Stamping Co., which is not in the consolidation, has been making its own open-hearth bars for several years. Other tin plate makers supposed to be outside the consolidation at the final count are Lalance & Grosjean Mfg. Co., Harrisburg, with tinware factory at Woodhaven, L. I.; Canonsburg Iron & Steel Co., Pittsburg; Whitaker Iron Co., Wheeling, W. Va.; Neshannock Sheet & Tin Plate Co., New Castle, Pa. (black plates only); Marshall Bros. & Co., Philadelphia, and Somers Bros., Brooklyn, N. Y. These make a total of 34 hot mills. Some of these mills have not been operated for some time.

Despite efforts at secrecy, rumors are current of a number of projected tin mills. The names include one at least of the prominent Eastern tinware manufacturers, a large dipping concern, a large firm of tin plate brokers outside of New York City, and several concerns not now in business. It can be stated with almost absolute certainty that part of the capital in some of these cases will be furnished by retiring tin plate makers. The price of 100-lb. coke plates, maker's mill, will probably be put above $2.80, the figure recently named.

A WARRANT CORNER ABROAD.

The workings of the pig iron storage system have been presented to the American iron trade in their most attractive phases. Warrant stocks never have been an important factor in the domestic market, and only in the past 18 months have they increased so as to attract attention. The theory of the warrant system has been presented in its best light, with skillful emphasis on the good points and skillful gliding over the unattractive ones. For its practical operation one must go for information to the British markets in which the system comes to its full flower. This bit of record, for example, found in a Middlesbrough market report of Nov. 10, is instructive:

The prolongation of the "squeeze" in Cleveland warrants has tended to paralyze legitimate business in Cleveland pig-iron this week, and sales have been of moderate extent only, for, naturally, all who could hold off are doing so. Such a situation as this is particularly unfortunate for the well-being of the trade at this time of the year, for the loss to legitimate business cannot so easily be regained as it might have been if we had not been so near the close of the Northern navigation season. Consumers abroad cannot wait until the "rig" has terminated, and thus have to look for a portion of their supplies elsewhere. And the worst of it is that any benefit that is derivable from the present state of affairs goes chiefly into the hands of speculators, while the legitimate trade suffers. The "squeeze" has altogether been confined to Cleveland warrants, which is a very unusual circumstance, for generally such a move is carried out in Scotch warrants. But now, while Cleveland warrants go up rapidly in price, Scotch are practically stationary; indeed, they have eased somewhat during the last few days, and one result of this has been that whereas a short time ago Scotch warrants were nearly 6s. per ton above Cleveland, this week the difference has been less than 9d., and some members of the trade expect to see Cleveland warrants within the next few days at the same price as Scotch, and probably they may be even dearer. No

one will be surprised if Cleveland warrants touch 50s. They have risen over 5s. within the last six weeks and over 8s. 6d. within three or four months. That the "rig" has been so long continued is not easily understood, but it is evident from it that the "bears" have been very much oversold They no doubt never expected a situation like the present, and counted upon being able to buy Cleveland iron whenever they chose to come in as they have in times past. But the scarcity has been a revelation to them, and they have found it exceeding difficult to cover, and sellers have had it all their own way inly fixing prices. Thus almost every day there are advances in the quotations for Cleveland warrants, and buyers have no alternative but to pay them.

The most interesting phase of the matter is that manipulation by warrant speculators has wiped out the difference of $1.50 to $2 a ton ordinarily existing between Cleveland and Scotch irons. The freight from the Cleveland district is such that ordinarily the lower price permits of shipments to Scotch markets, where a certain percentage of the iron is used. Now, however, such shipments are entirely cut off. The market, for the time being, is entirely in the hands of speculators, and the advance in so short a time is unprecedented.

Temporarily such a condition might be considered advantageous to makers, who are able to make sales at the high prices. But the possibilities on the other side may be judged by imagining the "bears" instead of the "bulls" in control, and prices tumbling under the hammering of speculators having not a dollar's worth of interest in the iron trade except as it furnishes material for gambling operations. Fortunately the trade in the United States understands too well the perils of speculation, to lend encouragement to the establishment of such an influential institution at home. Stability, not fluctuation, must be the study of American iron manufacturers to-day.

A QUERY CONCERNING CAST IRON.

One of the topical questions to be discussed at the coming New York meeting of the American Society of Mechanical Engineers is whether any improvement in foundry practice has been observed, from the recent investigations into the physics of cast iron. The question seems premature. One of the chief developments of the investigation referred to, is that the foundry world has no basis for the comparison of the physical properties of cast iron; and thus far the voluminous discussions before the mining engineers, mechanical engineers and the various associations of foundrymen have been conspicuous for the differences they have emphasized, in methods and results of testing operations. Believing that the international movement for the unification of testing methods had no more promising field than that of cast iron, the American Foundrymen's Association took up this important question at its Cincinnati meeting last June. A report of progress by the committee appointed at Cincinnati appears in aother part of this issue. Certainly progressive foundrymen, who have been interested in this movement because they understood its possibilities for throwing light on a perplexing subject, will appreciate the labor that has devolved upon the committee and its helpers. Something of this is indicated in the statement that for the strength tests for 11 classes of cast iron, nearly 22 tons of test bars must be prepared—a total of 2,200 bars, round and square, or 200 bars for each class of castings. The undertaking is a prodigious one, and one that nothing less than the spirit of the true investigator would ever lead busy men to undertake. Dr. Moldenke's ambitious programme and Mr. West's method of securing test bars which shall be free from the suspicion of variations in casting operations, and the tireless efforts of both in pushing forward the work, are highly commendable. Months will elapse before results can be tabulated; but with the co-operation which the committee's labors have enlisted thus far, among foundrymen of experience and standing, it is to be expected that a noteworthy contribution will be made to the literature of foundry testing.

Two years hence, we predict, the question propounded for discussion at New York next week can be answered far more definitely and satisfactorily, than is possible with the contradictory and often unreliable data of to-day.

PERSONAL.

William E. Hale, who was the originator of many improvements in the manufacture of elevators, and from 1870 to 1887 the principal owner and president of the Hale Elevator Co., died at his home in Chicago, Nov. 16, aged 62. Mr. Hale had been in business in Chicago for 36 years, and was connected with the Hale company from its inception until its consolidation with the Otis Elevator Co. He was also interested in many other business enterprises, and was a large owner of Chicago real estate. He was widely known as a generous giver to churches and for charitable purposes, and devoted a share of his large fortune to the Beloit College at Beloit, Wis.

J. W. Seaver, of the Wellman-Seaver Engineering Co., Cleveland, sailed Saturday on the Fuerst Bismarck for a two-months' trip in Europe.

Michael Baackes, on retiring as superintendent of the Cleveland wire nail plant, formerly operated by the Baackes Wire Nail Co., was presented with a gold watch and chain by the employes. The inscription reads: "Presented by 900 employes to the founder of the Baackes Wire Nail Co."

Harris Tabor, of the Tabor Mfg. Co., manufacturer of the Tabor molding machines, sailed for Liverpool Nov. 12 on a business trip.

W. H. Pratt has been appointed manager of the works of the Universal Construction Co., of Chicago, going from Mt. Vernon, O., where he was receiver and manager of the Mt. Vernon Bridge Co.

C. E. Fowler, for the past six years chief engineer for the Youngstown Bridge Co., of Youngstown, has tendered his resignation, to take effect Dec. 1.

Auguste Dutreux, Fritz Lurmann, Joseph Balleydier and Paul Mossot, enigneers of the steel works of Chatillon, Commentry and Neuves-Maisons, France, are making a tour of inspection of the principal steel works of the United States.

Phineas P. Mast, the well-known manufacturer of Springfield, O., died at his home Nov. 20, aged 73 years. He was the principal owner of P. P. Mast & Co., Mast, Foos & Co, and other concerns, including a gas company and a bank. For nearly 40 years he had been engaged in the manufacture of agricultural implements.

F. W. Denton, formerly mining engineer for the Minnesota Iron Co., and for the past three years connected with the school of mines of the University of Minnesota at Minneapolis, has resigned his position and on Dec. 1 will become superintendent of the Winona copper mine in Northern Michigan.

THE Canonsburg Iron & Steel Co., Pittsburg, is putting in foundations for an addition of two tin mills and one sheet mill. The tin mills will comprise three stands of rolls, one roughing to two finishing, and will be arranged so that they can be run on sheets when desired. The new sheet mill will comprise a stand of roughing and a stand of finishing rolls. All three mills will be equipped, as is the practice at the plant, with three furnaces, pair, "single," and sheet heating furnaces respectively. Contracts for the mills have been let.

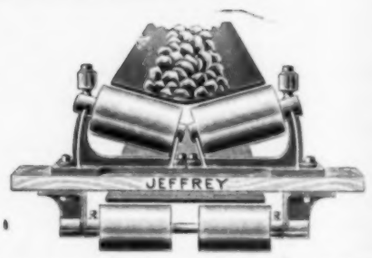
AFTER a number of experimental runs, the new sheet and tin bar mill of the Shenango Valley Steel Co., New Castle, Pa., was put in permanent operation last Friday morning, and steady shipments of bars are being made. The mill contains about 25 stands of rolls, so arranged that the pieces are never between more than one pair of rolls at a time. The slabs are sheared in two, half being made into billets and the other half into tin bars. The last stands of bar rolls have two passes. At present 12-inch bars are being rolled but wider bars can be made later, if desired.

CENTURY CONVEYOR BELT.

The "Century" conveyor belt, illustrated below, has been brought out by The Jeffrey Mfg. Co., of Columbus, O., for conveying materials of various kinds, particularly for handling gritty and abrasive material—ores, broken stone, gravel, sand, and the like.

It has been demonstrated in everyday practice of The Jeffrey Mfg. Co. that a belt, in order to withstand severe usage, should possess not only strength but also be of a composition to resist the abrasive effects of the materials handled. In the Century belt plies of extra heavy duck extend the full width, being thoroughly vulcanized together with rubber of a special composition suited for the work. The carrying side of the belt is made with an extra coating or covering of rubber of such thickness as the nature of the work demands. This makes a pliable belt, which when placed in position on the special idlers, forms a trough whch carries the matrial to its destination successfully and without spilling. The angle of the carriers is such as to give the belt a perfectly natural curve without any sharp or abrupt bends that would cause cracks or breaks in the belt, thus enabling it to perform its work to the best advantage with a minimum of wear and tear.

The Century conveyor belt is made to have uniform strength throughout its entire width and thickness, so that in service it will perform a reasonable amount of work even after the reinforced surface has been worn off. One of the illustrations shows the trade-mark under which this belt is being exploited. Another shows a full size end section of a



4 ply Century belt with an extra thickness or cover of ⅛ inch; a third shows the Jeffrey carrier idlers used in connection with this belt. These are made in different sizes to meet the requirements. The belt can be had in all plies and widths, with the carrying surface reinforced to any thickness the work requires.

Mr. Abram Ammerman, superintendent of the Jackson Architectural Iron Works, of New York, informs us that the mixture used at that establishment for pickling brass castings, such as oil cups, pump boxes, injectors, etc., is: Two parts by measure of nitric acid and three parts sulphuric acid, with a handful of table salt to each quart and no water. The pickle may be held in any suitable receptacle, say, of glazed earthenware or a vitrified bathtub might do, although it is only necessary to provide a vessel large enough for the immersion of the largest piece to be handled. The pieces are simply dipped in and removed at once and rinsed in clear water. This is merely for cleaning and brightening the castings. Various dips are used for giving different colors.—[American Machinist.

The statement is authorized by a director of the American Steel & Wire Co. that eight per cent is being earned on its common stock. "There was considerable liquidation of the common stock some time ago," he said, "due to the desire of holders to obtain some money in order to come in on the underwriting scheme of the Federal Steel Co., but there is now no stock on the market, so far as the insiders are concerned. A dividend of not less than four per cent will be paid and very likely the amount will be six per cent.

In connection with the letter of Mr. J. B. Hammond, on fire brick for coke ovens, reprinted in our issue of Nov. 17, it should have been stated that the letter formed part of a series of articles on "Coke Making for Profit" contributed to the *American Manufacturer* by Fred C. Keighley.

Review of the Technical Press.

[Translation, Condensation and Comment expressly for The Iron Trade Review by Dr. Richard Moldenke.]

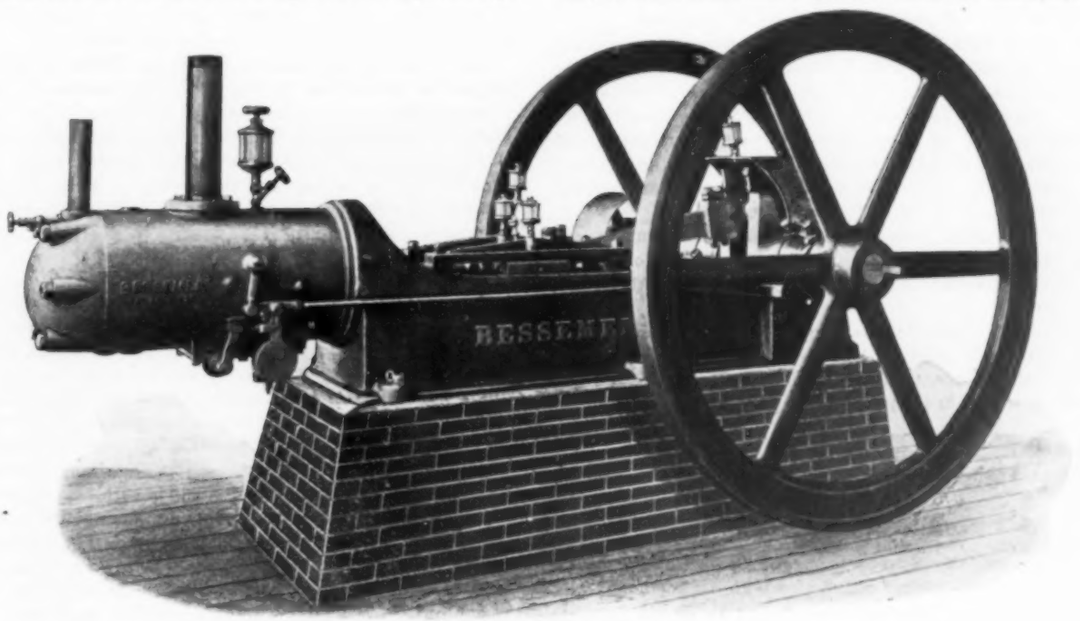
Diffusion of Sulphide Through Steel. [*Ironmonger*, Sept. 10.]—Mr. E. D. Campbell, of Ann Arbor, Mich., gives some supplementary notes on the diffusion of oxysulphides through steel; his former work having been criticised by Mr. J. E. Stead. The mixture used was the result of melting 250 parts sulphide of iron containing 26.31 sulphur, 13.25 parts black oxide of iron, and 42.65 parts oxide of manganese. This mixture of oxysulphides was put into a hole bored in the steel and plugged up. The steel was wrapped with asbestos and heated for about three hours. The oxysulphides diffused out of the bar, showing steel to be practically porous when at a white heat. To prove that this power to travel did exist, a weighed amount of copper was added to the charge in the hole and afterwards accounted for in the body of the bar, the exterior scale, and the asbestos. It was noted that the diffusion was only complete in an oxydizing atmosphere and that the best results were obtained when the smooth hole made by the drill was thoroughly etched by the use of hydrocloric acid.

The Interior Strains of Hardened Steel. [*Stahl und Eisen*, Oct. 15.]—Mr. O. Thallner contributes an article on the above subject in which he discusses the theories advanced to explain the occurrence of cracks in hardened steel. Reiser attributes them to changes in volume, while Barus and Strouthal showed that differences existed both in volume and specific gravity between the very hard outer layers and the softer inner ones. They claim that the strains thus produced are the cause of the fissures so often seen in steel after hardening it, the outer layers cooling quicker, compressing the interior. A series of experiments made by Mr. Thallner, who is superintendent of the "Bismarkhuette," to trace the influence of manganese and silicon in steel upon its change in volume developed some points which seemed to throw doubt upon the above theory. He therefore publishes his observations, which are of an entirely practical nature, for the benefit of whom it may concern. The strains in hardened steel must necessarily be twofold: Those which are present in uniformly hardened materials of small cross sections, and those existing in heavier bodies with the differences in volume above described. The first series of strains as a matter of fact exist also in the heavier sections of steel and more especially in the hardest portions, that is, at the surface. Now if a small piece of steel is hardened uniformly, as seen by its microstructure, and it breaks, the claim of strains due to a compression of the interior cannot be advanced. In hardening large cross sections of steel cracks may start both at the surface and in the interior, but according to the theory of a compressed interior no cracks could start there. Therefore the conclusion of Dr. Wedding that the outer shell which is suddenly cooled and retains a volume due to its higher degree of heat before quenching, instead of compressing the interior rather extends it and gives it a lower specific gravity, is in direct opposition to the current theory. If now there are strains existing in a uniformly hardened piece of steel they can only be intercrystalline and would tend to cause a complete separation there. In hardening a piece of steel there are certain changes in the condition of the carbon which are kept intact at the instant of quenching. In heating a piece of steel up to the melting point molecular changes take place, the volume is increased, the strength and ductility are gone. In such a condition the crystals have naturally separated a little and the carbon pres-

ent is all dissolved. Sudden quenching keeps the carbon in this shape, prevents a separation and consequent return to the original molecular grouping, and leaves the steel brittle. In iron this sudden quenching does not prevent a return to the original form, hence in the first case the volume is changed and in the last it is not. It may be readily supposed that the iron constituent in steel upon quenching will retain this tendency to go back to its original form, while the steel part will not, hence a certain resistance to uniformity in effect is introduced and thus the strains are produced. These strains will be twofold; the force exerted by the crystals in attempting to get into their proper grouping, and the force exerted by the carbon to prevent this. The resultant of these two forces may be zero, but usually is not and the piece either becomes stronger or else cracks. What effect upon these forces the impurities in steel may possess is not known, but the supposition is that manganese will assist in a proper knitting of the structure, and the hardening influence of carbon is enhanced by the addition of tungsten, molybdenum, nickel, etc., while phosphorus, sulphur and copper tend to separate the structure and hence weaken it. These suppositions may explain why a high amount of impurities may cause fissures in the hardened steel. If carbon does possess the property of opposing a reduction in volume on the part of a steel when quenched, then the result of so doing would be equivalent to hammering cold and the increase in volume will be permanent. Moreover, upon annealing this volume must be increased again. This is actually the case, and a combined quenching and annealing enlarges a steel to such an extent that the change is easily noticeable with the eye, and the increase in volume at each successive hardening can be measured. If two pieces of steel are hardened repeatedly, one without successive annealing and the other with, that piece which did not receive this extra annealing treatment will be found the largest in volume. The annealing, therefore, counteracted the carbon a little and allowed the crystals to get together. Hammering steel cold raises the elastic limit and ultimate strength but lowers the elongation This is not because of a change in the carbons but by the creation of internal strains as a result of the forcible compression, part of the work being converted to heat. If carbon exerts an influence upon quenched steel similar to that of mechanical treatment, then must there result the same residual changes in strength whether a piece is hammered cold or quenched and then annealed. This is the case, the elastic limit and ultimate strength is higher in each case. The elongation, however, is different, hammering cold reducing and the heat treatment increasing this. The explanation for this is that hammering compresses the structure, while annealing opens it. The strength imparted to steel by mechanical treatment is not uniform and is quickly removed by annealing. The conclusion is that if the above is correct there are no internal strains in heavy cross sections unequally hardened by the exterior compressing the interior.

THE BESSEMER GAS ENGINE.

The Bessemer Gas Engine Co., of Grove City, Pa., has been manufacturing for the past eight months the type of gas engine indicated by the illustration, designating it as the "Bessemer." It is a single acting gas engine; that is, when working at full load it receives power with every revolution of the crank shaft, but when working at less than full load it receives power only when necessary to maintain desired speed. A special feature is the fact that the cylinder may be placed on any overhanging cylinder steam engine bed, to make a gas engine. This, especially in the oil country, is very successful. The Forest Oil Co. alone has over 250 of these cylinders and is steadily adding to the number. Other oil companies are using the cylinders and a large business is developing for the manufacturers apart from the building of complete engines. Steadiness of motion is characteristic of this engine. It will be noticed from the illustration, which is a view of the right side, showing the governor, that complicated mechanism is dispensed with. Adaptation to electric light work is a strong point claimed, especially for private electric light plants, where ease of management, simple construction and quiet running are desiderata. For driving heating and ventilating fans, the Bessemer engine, it is claimed, would be particularly effective, the rattle and explosive vibration characteristic of many gas engines being objections in this service. The Bessemer engine was exhibited at the Pittsburg Exposition this fall, and attention was directed to it for its fewness of working parts, ease of starting and noiseless action, which the manufacturers compare with that of a sewing machine.



THE BESSEMER GAS ENGINE.

The Bessemer Gas Engine Co. is composed of John Carruthers, E. J. Fithian, H. Murry, and others. It commenced business about April 1 of this year, and has already outgrown its shop, with a floor space of over 7,000 square feet. An addition is under way, to be used for a testing room and finishing department. The lower floor is occupied by the heavier machinery; the upper floor by the office, drafting room, lighter machinery, and a well equipped pattern shop. The present capacity of the works is two engines a day, but with the additional space and special machinery now being provided, the company states that by Jan. 1, 1899, it will have a capacity of six engines a day. C. K. Hill, electrical contractor, of Pittsburg, has just finished an electric light plant for the company, and a steam heating plant is now being added. It is the purpose of the management to make the works a model one. Plans are being considered for the erecting of a new machine shop to the east and a foundry to the west of the present building.

THE galvanizing plant of the Consolidated Barb Wire Co., Lawrence, Kan., was put in operation last week. The furnace has a capacity of 25 tons a day.

INDUSTRIAL NOTES.

James G. Caldwell, president of the Birmingham Rolling Mill Co., formerly a resident of Louisville, assigned, Nov. 17, to the Fidelity Trust Co. of that city. The assets will probably amount to more than $80,000. The liabilities, it is said are much larger. The assignment was precipitated presumably by a suit filed this week against Mr. Caldwell by the Louisville Trust Co. on a note for about $9,000.

The wheel molders at the Pennsylvania Co.'s foundry at Altoona, Pa., have been notified of a reduction of 5 per cent in wages.

The Pittsburg, Bessemer & Lake Erie Railroad has placed orders for seven new locomotives. Two will be built by the Brooks Locomotive Works, two by Baldwin, and two consolidated engines and one shifter by the Pittsburg Locomomotive works. The consolidated engines will weigh 164,000 pounds each. The company will also place an order for steel hopper cars soon.

The capital stock of the Indianapolis Drop Forging Co. has been increased from $15,000 to $40,000.

Instead of the usual shut-down of weeks, the J. I. Case Threshing Machine Co., of Racine, Wis., was idle only ten days this year, resuming early in November with full force.

The Oswego Boiler Works fire loss at Oswego, N. Y., has been settled for $25,000. The machinery cost $50,000 and the building $17,000. It has not been decided to rebuild.

The case of John F. and Fuller Hogsett, executors of Robert Hogsett, against W. J. Rainey, the coke operator, to recover $321,000 on a mortgage given for certain coal leases in Fayette county, was called for trial in the United States Circuit Court at Pittsburg, Nov. 21. The defense is that the amount of coal in the land covered by the leases did not warrant the payment of so large a sum, and that the defendant paid pro rata for all the coal he got out of it.

The Youngstown Iron & Steel Roofing Co., Youngstown, O., through its New York agents, Wm. Stevens & Co., recently shipped an order of expanded metal lath to Algoa bay, South Africa.

The Illinois Steel Co. has bought of the Cheltenham Improvement Co. a tract of land between 79th nd 83rd streets, east of Ontario ave. to Lake Michigan for $350,000. The erection of a cement plant for utilizing blast furnace slag has been talked of, but the company says that no definite extension plans have been made. Some track additions are to be laid, occupying a portion of the land.

An Italian Steel Maker in Pittsburg.

E. Hannesen, an open-hearth steel manufacturer of Genoa, Italy, is in this country in connection with his business. Last week he was in Pittsburg. For some time he has been importing scrap from the United States for use in steel making. The pig iron is wholly imported into Italy. Old steel rails have been preferred in the steel work at Genoa on account of their uniformity as compared with other scrap. Freight rates at present are a serious handicap to the trade While the freights from England are less, the scrap has been imported mainly from the United States because the local prices are considerably lower. Mr. Hannesen is interested in rolling old rails into new ones, and will investigate the McKenna process in this connection. Nothing may come of this, however, owing to a peculiar form in which the Italian tariff is placed on such articles. The regular tariff on old rails is 60 francs ($12) a ton, but if used for remelting, as has been done in the works referred to, the tariff is but 10 francs ($2), which makes a difference of 50 francs or $10 a ton. In the latter case there is a government inspector at the steel works to see that the material is used only as scrap.

Mr. Hannesen advised our representative that there were three tin plate works in Italy, one rolling the black plates from the imported bars, and the other two being dipperies. Another black plate mill had been built but failed through mismanagement. He was greatly surprised when told that tin plates were sold in this country as low as $2.60 per 100-pound box at mill. The dipperies in Italy buy their black plate, from Wales, and find the coating business fairly profitable because the duty on tin plate is 180 francs ($36) a ton, while the duty on black plate is only 120 francs ($24) a ton, so that there is a protection for the dippers of 60 francs, or $12, a ton.

LAKE SUPERIOR IRON MINES.

A deal has been closed by which three-fifths of the stock of the Sunday Lake and Iron Chief mines at Wakefield, Mich., has been transferred to Oshkosh, Wis., interests for $150,000. The remaining two-fifths are owned by Richard Guenther, of Oshkosh, and Chas. Pfister and Edward Aschermann, of Milwaukee. The two properties will be worked by the new owners. The Iron Chief has been idle for several years.

The hearing of the Minnesota iron ore freight rate case will be resumed before the State railroad commissioners at Duluth, Nov. 28. .Further testimony is expected from both sides. The mining companies will, it is said, introduce expert testimony to prove the early exhaustion of the Minnesota deposits, and witnesses on this point will be brought from the old ranges.

The suit for $51,000 brought by W. C. Yawkey, fee owner of the Commodore mine, against the Commodore Mining Co. has been removed to United States Circuit Court. The company says that it was to pay 35 cents a ton on all ore removed, and that if there was any agreement for a minimum output of 50,000 tons a year up to 1899, and 100,000 tons annually thereafter, as alleged by the plaintiff, it does not know of it, nor does the original sublessee, from whom it got the mine. The company has mined 129,000 tons from the property and has paid 35 cents a ton on this, and denies any further indebtedness. It is intimated that a further suit may grow out of the seizure of the mine by the fee owner.

The terms of the lease of the Savoy (Miller-Brown) property to the Oliver Iron Mining Co. include a bonus of $250,000, of which $50,000 is in cash and the balance at 10 cents a ton added to the royalty on the first 2,000,000 tons mined; a royalty of 30 cents with a minimum of 100,000tons, and if 300,000 tons be reached in any year the royalty to be 25 cents. The mine is 1¼ miles east of the Chandler. There are 80 acres in the tract.

Pig Iron Casting Machine Patents.

Negotiations have been concluded for the transfer of the patents on the Laughlin pig iron casting and conveying apparatus to the Carnegie Steel Co. which now controls, as is well known, the Uehling patents. Jones & Laughlins, Ltd., have built a machine of the Laughlin type for use at their Eliza furnaces and a similar one is now being installed for the Tennessee Coal, Iron & Railroad Co.'s Ensley furnaces. The chief difference between the Uehling and Laughlin machines is that the former sprays the molds with lime water to prevent sticking, while in the Laughlin machine the molds pass through a tank containing a clay wash. The Laughlin machine, it is stated, has been offered to furnace companies installed complete for $10,000, whereas the terms for the Uehling machine call for a $5,000 royalty payment apart from cost of erection.

London iron trade papers note that a demonstration was given Nov. 9 of the Uehling casting apparatus recently erected at the works of the Millom & Askam Hematite Iron Co., Ltd., a large number of English iron masters being in the visiting party. J. W. Miller, of Pittsburg, was present representing the British Uehling Co., and in connection with the lunch responded to a toast to his company. Mr. Muir Ritchie, of the Millom & Askam Co., said that British iron manufacturers had been conservative, but the opinion was gaining ground that they must wake up, not to compete with the United States, whose natural resources put it in a very different category from that of other makers, but with Germany, Belgium and Austria.

Some good work on basic iron, both in amount of output and evenness of analyses, has been done of late at Buena Vista Furnace, Buena Vista, Va., Frank F. Amsden, manager. The product has proved especially desirable for basic open-hearth work by reason of its comparatively low phosphorus and high manganese. The October output averaged as follows: Silicon, 0.70 per cent; sulphur, .032; phosphorus, .330; manganese, 2.30; graphitic carbon, 2.66, combined carbon, 1.16.

The Lorain Steel Co. has purchased from the Sandusky Stone Co. its limestone quarry at $23,000. A new crusher will be put in and shipments increased to 18 cars a day.

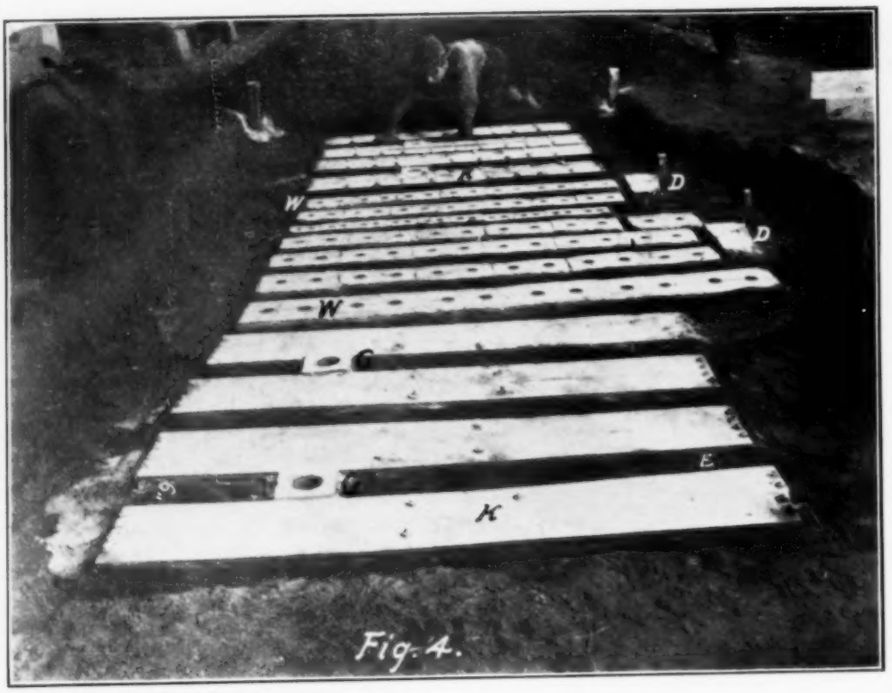


Fig. 4.

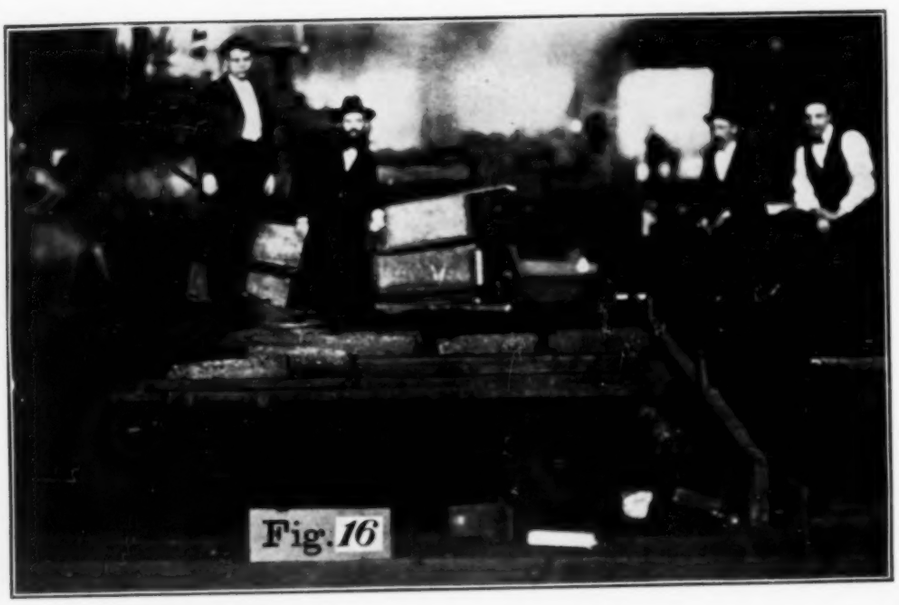
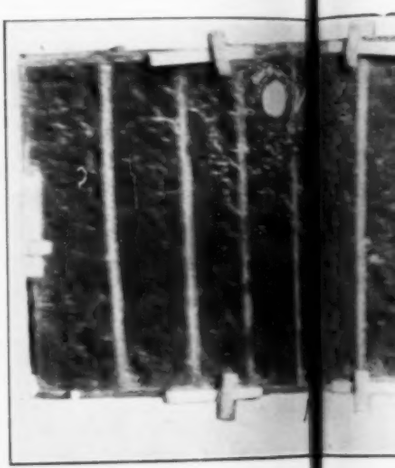


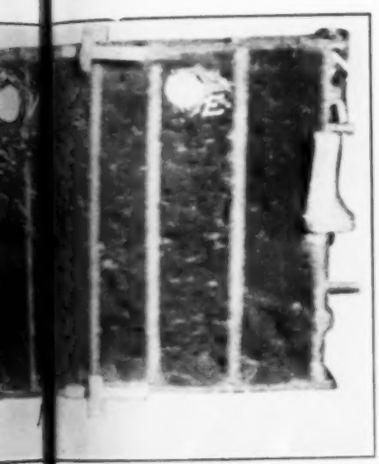
Fig. 16

Fig. 17



Method of Casting Te r the A drymen's Asso ing Co

Fig. 6.



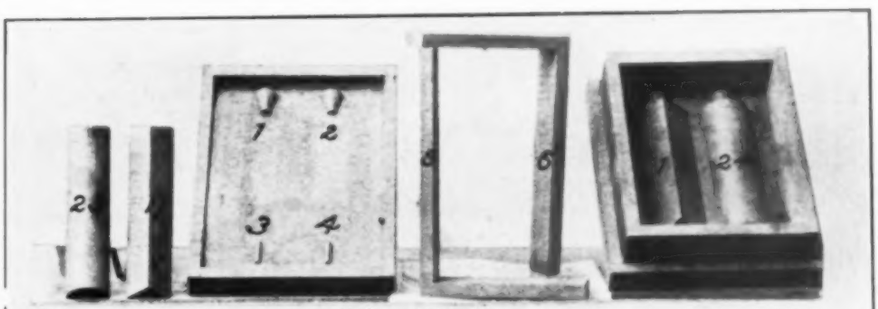


Fig. 7.

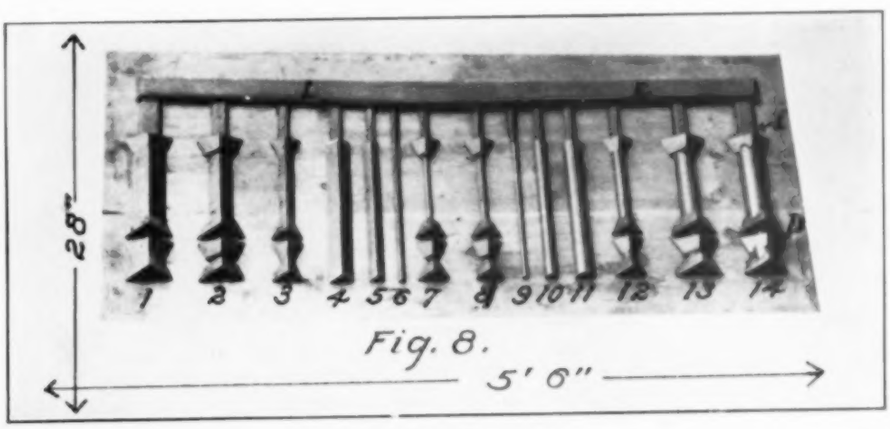


Fig. 8.

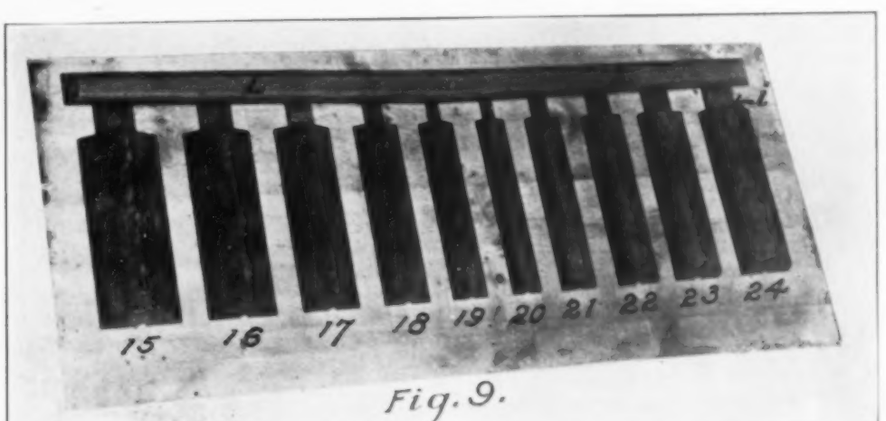


Fig. 9.

**ng Te the American Foun-
Asso ing Committee.**

Method of Casting Test Bars for the A. F. A. Testing Committee.*

BY THOS. D. WEST.

There is no metal whose physical qualities are so easily and radically affected by thickness and rate of cooling as cast iron. A casting ½ inch thick and another 4 inches thick in steel, for example, show very little difference in the structure of grain, whereas such variations of thickness in cast iron may cause the light body to be very dense and hard, while the heavier body will be open grained and soft. Then, again, we can take the same thickness in two castings and by cooling one more quickly than the other, cause one to be white, while the other will be gray in its body, all being poured from the same ladle of metal.

The rate of cooling is a factor as important in its effects in altering the structure or grain of cast iron as that of differences in the thickness of casting, and can be controlled in three ways: First, by having the mold of sand or of iron. Second, by varying the nature and dampness of the sand, or thickness of the iron chill forming the mold. Third, by variations in the temperature of fluidity of the melted metal at the moment it is poured.

Variations in the pouring temperatures of metal often greatly affect the strength of iron, but in what direction, according to the grades used, is yet to be clearly established, as in some mixtures a dull iron increases the strength, while in others the reverse is true, on account of the influences affecting the carbon in being combined or free in the iron.

A study of the various conditions affecting the grain of cast iron should demonstrate that any attempt to obtain comparative test specimens from which correct deductions can be expected, to define the physical qualities of cast iron, should be made on a plan which permits pouring at the same temperature, and casting in a position permitting the most uniform cooling and giving the most uniform grain in the specimens. These are conditions which the writer, in previous papers, has shown to be essential in making any sets of test specimens to be used for comparative purposes.

Very contradictory, or at least unreliable results are all that can be compiled from most all existing records of tests intended to be comparative. This is largely due to the intricate and delicate nature of cast iron and the want of practical knowledge of founding on the part of most experimenters. It was in recognition of the great need of a more correct basis for comparing physical tests that the American Foundrymen's Association, at the suggestion of Dr. Richard Moldenke, appointed a committee at the last annual meeting to take up the work of showing what cast iron is and what may be expected of it, in the production of castings and the use of different sizes of test bars. To do this properly it is necessary to obtain test bars from more than one grade of iron. It is an error to think that one grade will establish comparative records that would show what cast iron is. Instead of there being but one grade of iron to be tested, we have fully eleven grades which must be gone through before complete records of any value can be had to represent the physical qualities of cast iron. When it is stated that there are about 200 bars in each of these grades of iron, ranging from ½ in. to 4 in. square and round, 15 in. long, half to be made in green sand and half in dry sand molds, the weight being nearly two tons for a single set, or 22 tons in all, the magnitude of the work which the American Foundrymen's Association has in hand, as outlined by Dr. Moldenke, will be recognized.

In starting this work, much time was expended in completing plans of procedure as the magnitude of the undertaking required that every step be well studied to make sure of giving the best that was possible to attain the true strength, contraction and chilling qualities of cast iron, as it is used to-day. After all plans were arranged, the work of constructing the patterns, core boxes and flasks was taken in hand and furnished by Dr. Moldenke and myself. Designing the method for casting these bars, and making the first set was assigned to the writer. Knowing the importance of casting on end and pouring all bars in any set (to be used for comparative purposes) from the same ladle of iron, and if possible, at the same time and temperature, the writer originated the plan shown herewith, which has proved most successful and embodies principles that may be utilized to advantage in other lines of founding.

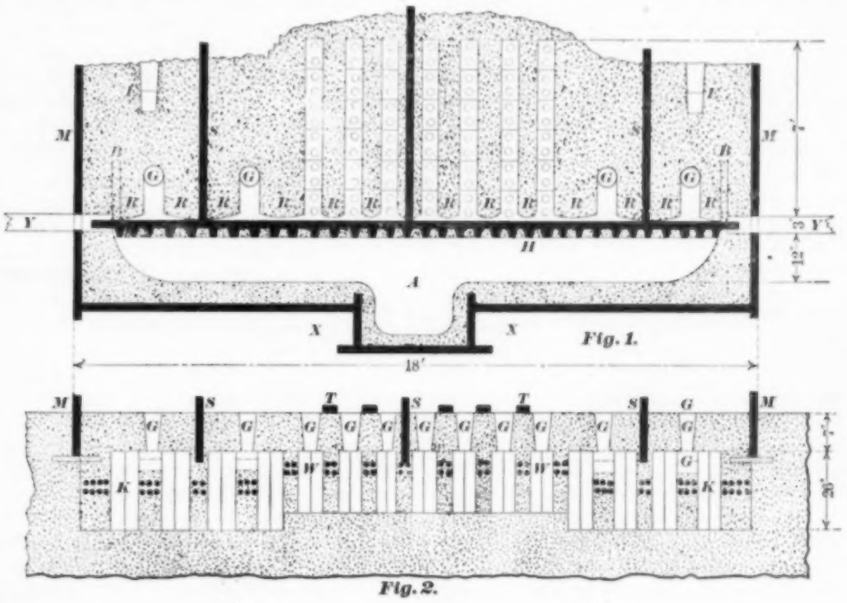


Fig. 1.

Fig. 2.

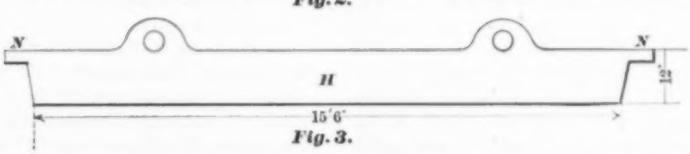


Fig. 3.

To give a general idea of the character of this work, before proceeding to details, the reader is referred to the illustrations. Fig. 1 is a plan view of the molds with their runners and gates, before being weighted down ready for casting. Fig. 2 is a section behind the inlet plate H. Fig. 3 is a working sketch of the inlet plate H. Fig. 4 (Supplement) a plan of the cores and green sand mold as they appear in the pit before the last ramming around the bodies was done. Fig. 5 is a view of all the molds and their runners just before casting. Fig. 6 shows the act of pouring, before the inlet plate H is lifted, but by reason of the gases escaping from the cinder bed under the reservoir runner A, the picture is not as clear as it

* To be read before the Pittsburgh Foundrymen's Association, Nov. 28, 1898, and published in advance by request.

might have been. Fig. 7 is a view of the core boxes; the one on the right shows the box together, the one on the left, when it was taken apart. Fig. 8 is a face view of a mold board, showing the arrangements of pattern and gates; the same is to be said of Fig. 9. Fig. 10 shows a flask closed and on end ready for pitting. Fig. 11 gives two views of the tool used for printing tits in the molds to measure the contraction. Fig. 12 is an end and side view of cores used in molding the tensile test bars. Fig. 13 is an end and side view of the pattern used at M to form runners over all the cores as at W. Fig. 14 shows the form and plan of casting to obtain knowledge of the chilling qualities of the various grades, and which is told by breaking the castings K through their centers on a testing machine. The castings, as seen, are made in a wedge form running from a sharp edge to 4½ inches thick. This permits the one form and size of a casting to be used throughout all grades, a plan essential to obtain a comparative knowledge of the difference in the chilling qualities of the various mixtures which will be tested. These chill tests are made in a core as seen at Figs. 4 and 14. The faces of these cores are covered with part chill and part core, as seen at E' and H', Fig. 14. The chill E' is 1½ inches thick.

A fluidity strip ⅛ inch thick at the base running up to a knife edge 14 inches long, as seen at X', is gated in connection with the large casting K' as at R', Figs. 14 and 15, so that they can fill up only as fast as the chill castings do, which prevents any sudden dash of metal from giving a false effect in recording the fluidity of the metal. The length of these strips will give a fair idea of the difference which may exist in the fluidity of the different shops' metal, or if any dull iron was used at the moment a set of bars is poured. These fluidity strips will also serve to assist in defining the chilling qualities of iron in combination with the large casting K', as it is to be remembered that the hotter or more fluid metal is poured, the deeper it will chill, another evil or irregularity due to non-uniformity in pouring temperatures, which the writer has proved by previous experiments.

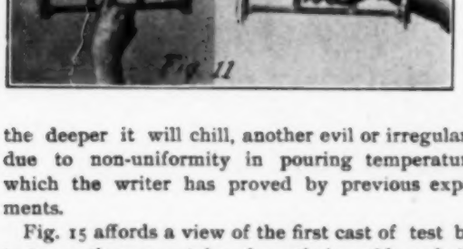


Fig. 11

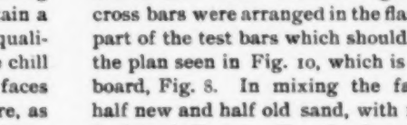


Fig. 12.

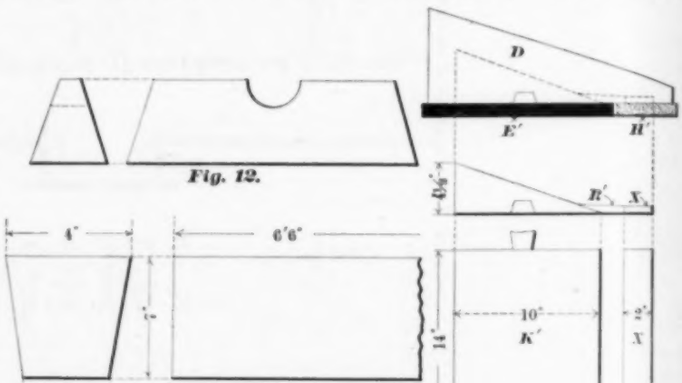


Fig. 13.

Fig. 15 affords a view of the first cast of test bars and chill tests, as they were taken from their molds and cleaned ready for shipment to the testing laboratory. Those on the left with flat gates were made in green sand, while those on the right with round gates, were made in cores. Preparing for and making this first set of test bars involved about 30 days' labor.

Figs. 16 and 17 give views of the second casting of test bars, which were made by the Westinghouse Electric & Mfg. Co., Allegheny, Pa. Fig. 16 shows the mold ready for casting. The gentlemen in the background, viewing the mold are: at the left, J. S. McDonald, foreman of the Westinghouse Electric & Mfg. Co.'s heavy work foundry department, and also member of our committee on testing; then Dr. R. Moldenke, chairman of the committee, who, with Mr. McDonald is watching closely that all the work of making the test bars follows the original plan; next in order Benj. D. Fuller, general foreman of the Westinghouse Electric & Mfg. Co.'s iron foundry department, and last, C. F. Knowlton, foreman of this company's pattern shop. A study of Fig. 16 will show that the exact plan used by the writer in casting the first set of test bars is followed, and that he did not originate a plan impractical of duplication. Fig. 17 is of value in showing the action of pouring after the inlet plate H, as described at Figs. 2 and 6, has been raised, to let the metal flow instantaneously to the molds, as Fig. 6 is only a view of the action of pouring before the inlet plate H is raised to admit the metal from the basin A to the respective molds. The Westinghouse Co. is kindly allowing Mr. McDonald to make two sets of these bars, and at this writing he is about ready to pour his second set. After this is finished, J. S. Seaman, of the Seaman Sleeth Co., roll manufacturers, of Pittsburg, will receive the flasks and rigging, and thus they will be transferred from shop to shop, until the whole 11 sets, or nearly 22 tons of test bars are completed. All having taken part in this important work will be given full credit in the report which the committee will present, giving the results of the test of all the bars. It is but just to remark that it requires experience in founding and men of ability to successfully oversee and mold up such a set of test bars after the plan herein described, but judging from the character of the men and firms who have consented to do this work, all may rest assured that the end sought will be as nearly attained as is possible with our present knowledge.

The flasks used for this work were all made of malleable iron so as to make them strong and light for handling. The cross bars were arranged in the flasks so as not to come over the part of the test bars which should fracture when tested, after the plan seen in Fig. 10, which is a flask taken from the mold board, Fig. 8. In mixing the facing sand for these molds, half new and half old sand, with 1 to 20 of sea coal, was used for board, Fig. 8. For the heavier patterns, seen on board, Fig. 9, the facing sand was mixed with 1 to 12 of sea coal. To form the recesses or separation of the long and short tensile test bars, as at P., Fig. 8, cores as at Fig. 12 were used, by placing them in the pattern and ramming them up with the mold. This is a little wrinkle that can often be used to good advantage in cases where green sand bodies are thought to be too small to stand the drop or wash of metal. These bars are used to obtain the tensile strength, while the straight ones seen on both boards are for transverse tests. In ramming up the flasks, a gate and riser was set on the main runner at L to look as at V and E, Fig. 10. It will be noticed that the runners L slope from the middle up to each end. The idea of this is to cause the first dash of metal to go direct to the smaller bars to assist in assuring their running, as in chill or hard grades of metal there is often difficulty in running light bodies. In ramming the sand in the flasks, care was exercised to ram it evenly and firmly, so that no swelling or scabbing can take place. Much care is also taken in venting as well as in finishing the mold. The swab was only allowed to be used at the junction of the gate and pattern at I, seen in Figs. 8 and 9. The reason for this is that if one part of the face of a mold is of a damper sand than another, it will cause an uneven texture in the grain of the iron, and hence every precaution was taken not to use the swab anywhere near that portion of the bar, which will break when tested.

Some will wonder why, to get the dry sand effect, in making the test bars, we did not mold them in iron flasks and dry in an oven upon the plan generally followed for dry sand work. The reason this was not done and the plan of making them of cores adopted, was that not all of the shops that would be kind enough to assist in this work, have drying facilities for flask work. In making a sand mixture for the cores, it was very desirable to have it of a character to crush easily when the bars commence to contract. After some experimenting the following mixture was adopted for making the cores:

1 part lake, river or bank sand,
3 parts of fine white silicon or crushed sand,

1 part of rosin to 25 parts of sand,
1 part of flour to 25 parts of sand,
1 part glutrose to 30 parts of sand.
Wet balance with water.

This sand mixture is one that possesses very little body to stand up in a green state; so much so, that in making the larger cores rodding is very necessary in order to keep the cores together. When this mixture is dry, the cores are exceptionally strong to handle; much more so than any made with a more loamy sand, having flour only for a bond. The effect of the above mixture when heated with molten iron is such that after solidification the core softens to such a degree as to cause practically no resistance to contraction taking place. Such a core mixture could be found of much value in work where, on account of the inability of cores to yield, castings have come out cracked, an evil with which many founders contend. These cores are all made in halves, and after being blackened, which is done in a green state with the large cores and in a dry state with the small, they are pasted together and after being dried are then ready to be set on their ends, in the ramming pit as at W, Fig. 2. The patterns seen on the mold boards, Figs. 8 and 9, are also used for making the cores, as can be seen by a study of Fig. 7, which shows the core boxes when together and apart.

The next operation to be noted is that of pitting the molds and cores. By referring to Figs. 1 and 2, a pit 18 feet long by 8 feet wide by 2 feet 8 inches deep, is seen to be necessary for this work. After the flasks and cores are set on level beds, as at Fig. 2, sand is filled in and rammed around the mold and cores until the levels of K and W are reached, when a double row of vents are made down each side of the cores, and flasks. This completed, a bed of fine cinders, as seen, is laid in between the cores and molds and also brought out to come in under the pouring basin A. These cinders are covered with straw or hayand the whole covered with sand. This done, the cores to form the gate connection G and riser E, as at Fig. 1, are placed in position. This brings the work up to a point as shown by Fig. 4. To keep dirt from dropping into the molds through the gate holes seen in the cores W, while sand is rammed between them, boards, not shown, cover the holes, and being weighted down remain stationary.

When the pit is rammed up to a level of the flasks and cores, the boards covering the cores are then removed, after which long runner patterns of the form seen at Fig. 13 are then placed over all the cores to form runners to connect with the main basin A as seen over W, Fig. 2. This done, plates are set on edge as at M, S and X, after which the inlet plate H is set up against the plates S, and plates as at B set against its ends, after the manner shown. This completed, a board 12 inches deep by 15 feet long is braced 11 inches away from the face of H and the whole bed is then rammed up and finished to appear as seen at Fig. 5. This cut also shows men in position to test lifting the inlet plate H by means of levers Y, resting on the plate M, to come under lugs N. Stops, as at P, prevent the inlet plate being lifted to any greater height than 2½ inches, which insures only clean metal passing to the molds, as when the basin A is filled by the ladle U, as seen in Fig. 6, all dirt must be confined and remain upon the surface of the metal in the basin A. To form the basin A and its adjoining runners, separated by the inlet plate H, special care is exercised to prevent the sand forming a division between the runners at the points R, Fig. 1, from being lifted or disturbed in any manner to create dirt, when the inlet plate H is raised to let the metal flow to the molds. This is done by hoisting out the inlet plate H entirely clear of the molds before the runner patterns are drawn and shaving or trimming the sand at the rear of the inlet plate to form a clearance at the face of the runners R, as shown. By thus trimming the sand, the only back support left for the lifting plate H is that afforded by the ends of the plates S and B, which is all-sufficient, and works as nicely as could be desired. After the divisions at R between the runners have their ends trimmed off for clearance, the runner patterns are all drawn and any dust lying upon the surface of the cores, which form the bottom of the runners, is then cleaned up with a small camel's hair brush, occasionally moistened in oil, to cause the dirt to stick to it. This work completed, the inlet plate H is lowered to place and care taken to know that it has a solid bearing along the whole length and width of its bottom surface, which is three inches wide.

Two risers are carried from the two outside flasks, as at E, and left uncovered when casting so that when the molds are filled all surplus metal remaining in the basin and runners can flow out readily to pig pits having a lower level than the pouring basin and runners as seen at C, Figs. 5 and 6, thus leaving the molds disconnected to be removed singly from their casting pit, after the gate connections between flasks at G are broken. This can be done while the connecting gates are hot or cold, as best suits the pleasure of the molder.

The purpose of the plan herein illustrated is to present ways by which any large number of test bars to be used for comparative purposes may be poured from one ladle and at the same time. The basin A being, as shown, one foot wide and deep, gives a body of fluid iron weighing about three tons, uniform in temperature. And when it is said that from the moment the inlet plate H was lifted to the time the 200 test bars weighing exactly 3,780 pounds were all poured, scarcely 20 seconds passed and no bars were lost, all will realize the success achieved.

Never in the history of founding has a comparative set of test bars been cast, so well calculated to give the engineer and machine builder a correct basis for computing the strength, contraction and chill of cast iron in its rough and planed states. The writer trusts that Dr. Moldenke will be permitted to complete the great work he has undertaken in testing the many sets of bars which are to go to him from liberal members of the American Foundrymen's Association, and feels sure that the engineering and foundry world will await with great interest a report from the committee of the results which are now being obtained.

NEW YORK MEETING, A. S. M. E.

The annual New York meeting of the American Society of Mechanical Engineers will be held at the society's headquarters, 12 West 31st street, New York, Nov. 29 and 30 and Dec. 1 and 2. At the opening session Tuesday evening, Nov. 29, the annual address of the president, Chas. W. Hunt, will be delivered. The business session of the annual meeting will be held Wednesday morning, Nov. 30. Various committees will report, including that on the revision of the 1885 code for the conduct of boiler trials. The papers scheduled for Wednesday morning are the following: "Note on Strength of Wheel Rims," by A. K. Mansfield; "The Bursting of Small Cast Iron Fly Wheels," C. H. Benjamin; "Cooling Tower and Condenser Installation," by J. H. Vail. Three queries are proposed for discussion: Does it pay to pickle ordinary castings? Has any improvement in foundry practice been observed from the recent investigations into the physics of cast iron? What is the strength of pipe fittings made by a casting process?

For Thursday morning the following professional papers have been assigned: "Theory of the Moment of Inertia," by C. V. Kerr; "Improvements in Steam Boilers," by W. B. Levan; "Generation and Utilization of Steam by the Lykens Valley Coal Co.," by R. Van A. Norris; "Valve Gear of the Willans Engine," by John A. F. Svenson; "Methods of Testing Indicators," by D. S. Jacobus; "Variation of Belt Tensions with Power Transmitted," by W. S. Aldrich. The topical questions are: What constitutes a seamless tube? and, On how small a tool does it pay to put an individual electric motor?

Friday's session, the concluding one, will be in the forenoon. The papers are: "Calorific Power of Weathered Coals," by R. S. Hale; "Mechanical Plant of a Modern Commercial Building," by W. H. Bryan; "Specific Heat of Superheated Steam," by R. C. Carpenter; "Experiments on the Flow of Steam through Pipes," by R. C. Carpenter. Two queries are proposed for discussion: Have you any new notions on machine shop floors? and, Is it of real advantage to submerge the smoke-box of an upright boiler to prevent expansion of the tubes?

The afternoons of Wednesday and Thursday will be devoted to excursions. On Thursday afternoon the members of the society go across to Elizabethport, N. J., to visit the new plant of the John Stephenson Co., Ltd., which represents advanced practice in electrically-driven tools.

THE WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, Nov. 16, 1898, at the Great Northern Hotel, Chicago. Vice-President Wm. Thompson presided in the absence of the president.

The following were present: O. T. Stantial, L. W. Lukens, Illinois Malleable Iron Co.; P. M. Chamberlain, C. E. Hoyt, Lewis Institute; Wm. Ferguson, Wm. Ferguson Foundry Co.; A. M. Thompson, A. McLean, Link Belt Machinery Co.; Major Malcolm McDowell; Hanson McDowell; G. W. Hughes, Pullman Car Co.; B. M. Gardner, W. E. Magraw, *The Iron Trade Review;* R. Cleveland, R. Barr, H. Ribold, Cleveland & Barr; Mr. Vail, Chicago Fire Clay Product Co.; S. T. Johnston, James Evans, Theodore Kauffman, S. Obermayer Co.; E. W. Smith, Crane Co.; C. De Graff, Holland Linseed Oil Co.; F. G. Coffeen, Deering Harvester Co.; C. L. Miner, Matthew Addy & Co., all of Chicago; W. N. Moore, Joliet Stove Works, Joliet, Ill.; H. G. Shumway, C. W. Shumway & Son, Batavia, Ill.; George Guy, U. S. Wind Engine & Pump Co., Batavia, Ill.

E. J. Baker, Kenosha, Wis.; R. S. Whitaker, of the Northwestern Wire Mattress Co., Kenosha, Wis., and J. A. Williams, superintendent Northwestern Wire Mattress Co., Kenosha, Wis., were unanimously elected to membership in the association.

The secretary read the following amendment to the by-laws, proposed by P. D. Sloan, which is to be considered at the next meeting. It is an amendment to article II. of section 3, which reads: "The annual dues of each active member of the Association shall be $10, payable quarterly in advance." It is proposed to amend it to read as follows: "The annual dues of each corporation or firm shall be $10, but the annual dues for each person eligible to membership in this organization who is not engaged as a manufacturer or jobber in his own name shall be $5, payable quarterly in advance."

The paper of the evening entitled "Metalloids in Castings," by Major Malcolm McDowell, was then read, as follows:

Metalloids in Castings.

Iron chemically pure is too soft for mechanical purposes, and is rarely found in native masses but mineralized in ores with different elements, metals and substances in the form of oxides, chlorides and fluorides, and when reduced to a metallic state these alloy and combine. Upon these alloys or combinations depends the commercial value of the ore.

The mineralized ores of iron are brought through the agency of the blast furnace to a metal of commerce, designated "pig iron," the constituent elements of which are of the utmost importance to the foundryman, for the value and usefulness of cast metal depends upon them.

"The allied metals with which iron will combine equally chemically and mechanically when reduced in a blast furnace are 13. Six of these are electro negative to it and seven electro positive. The electro positive are calcium, magnesium, beryllium, zirconium, aluminum, manganese and zinc. Copper and zinc are pyro-electro and change polarities with iron at different temperatures. The electro negative metals are chromium, vanadium, copper, cadmium, cobalt and nickel.

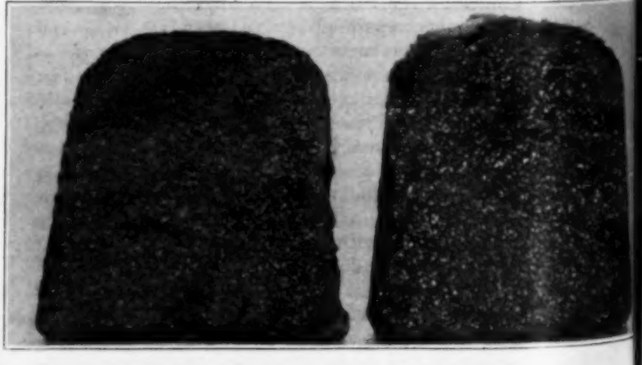
"The electro negative render iron electro positive, making it cold short, having a crystalline fracture and a polished surface is easily oxydized. The chill is well and clearly defined, white, hard and brittle.

"The electro positive render iron electro negative, making the iron tough, having an uneven or fibrous fracture and to a limited extent resisting oxidation. The chill has radiant streaks from gray back into chill of combined carbon, giving it a mottled appearance, making the chill tough but not so hard as in the electro positive."

The electro and pyro-electro conditions of metals are of interest and may often assist to account for some one of the many peculiar conditions of metal so often occurring, which the ordinary chemical analysis takes no account of, as it simply deals with iron, carbon, silicon, phosphorus, sulphur and manganese. These alloyed or combined together in certain proportions make what is commonly called "pig iron." The value of this metal depends on these constituent elements and a practical knowledge of them is what is desired by both the furnaceman and the foundryman—the former in making and grading his furnace product, the latter in buying his metal and making castings to meet certain requirements.

The output of pig iron in the United States for 1897 was as follows: For basic open-hearth steel, 556,391 tons; for Bessemer steel, 5,795,584 tons; spiegel and ferro, 173,695 tons; foundry and forge pig iron (including charcoal iron), 3,127,010 tons—a total of 9,652,680 tons. For the first half of 1898 the output was 5,249,204 tons, and this will reach before the end of the year nearly 12,000,000 tons, of which over 70 per cent will be used for steel and the bulk of the remaining 30 per cent for foundry iron. The 70 per cent is sold to those who know what they want; but a majority of the buyers of the balance do not know what chemical constituents are required to meet their special needs, and rely on the sales agents to tell them. The sales agent, in his turn, sells what he has for sale, guessing and hoping it may meet the foundryman's wants, and sometimes it does, but frequently it does not. And when it fails there comes a protest from the foundryman. The sales agent is the only one known either to the furnaceman or the foundryman, in most cases, and his interest is to sell the largest amount of iron possible. He undoubtedly does it honestly to the best of his knowledge of what the metal is and what the foundryman needs but in many cases neither the sales agent nor the foundryman knows anything of the merits of the various metals and metalloids which give value to the iron for making castings. The former shows to his customer a section of pig iron, and speaks in glowing terms of its merits and of the large amount of graphitic carbon it carries, as exhibited by the fracture.

The fracture or graphitic carbon, however, are not reliable factors in estimating the value of pig iron. The other constituent elements have much to do with the nature of the fracture, as have also the heat at which the iron was melted and the length of time it took in cooling. The fracture varies from a bright black, open, to a close, mottled, bright gray and black. The former indicates a large amount of graphitic carbon, and the latter the opposite, so that in grading one might be called No. 1 foundry and the other No. 3, judging from the fracture, while a chemical analysis of the pig would show something entirely different. As an illustration of this, a firm with whom I was engaged had submitted to them cards showing the analysis of two different cars of iron, guaranteeing the analysis. The seller was one of the largest pig iron dealers in the country, and the sales agent is noted for his honesty as well as for his knowledge of pig iron, as he was brought up as a furnaceman. But with all this back of the iron, as it was being unloaded each pig was broken and the iron graded according to the fracture. This was a peculiar case—the furnace selling according to chemical analysis, and the foundryman using the iron according to fracture. As there was such a marked difference between the fractures of the two grades I took three pigs from each grade, and after removing the scale drilled each pig and mixed the drillings of each grade thoroughly, and sent them to Dickman & Mackenzie, of Chicago, for analysis, with the result seen in the table.



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This is enough to illustrate that grading by fracture is quite likely to result in something entirely different from what one would expect to see, judging from the chemical analysis.

Pig iron is valuable to foundrymen in proportion to its

	Silicon.	Phosphorus.	Sulphur.	Manganese.	Combined Carbon.	Uncombined Carbon.	Total Carbon.
Open	2.68	.343	.013	.59	.125	2.72	2.84⅛
Close	3.30	.366	.014	.55	.12	2.43	2.55

richness in certain metals and metaloids that combine with it in making castings, and silicon is the most important of these alloys. But silicon, carbon and iron will not make a good casting, for they need a certain proportion of manganese and in many cases phosphorus is a desirable element. Sulphur under no circumstances is to be considered; if possible eliminate it.

It is the silicon that gives value to pig iron, and graphitic carbon is the evidence of its being in the metal, although silicon does exist in metal sometimes without a manifestation of graphitic carbon, as shown in the above illustration. The latter is, therefore, not a reliable factor on which to base the value of iron. Foundry pig should be graded and sold according to its silicon contents, as follows:

No. 1 foundry,	3.	per cent silicon, is worth, say			$10.75
" 2 "	2.75	" " " then worth			10.50
" 3 "	2.50	" " " " "			10.25
" 4 "	2.25	" " " " "			10.00
" 5 "	2.00	" " " " "			9.75

All below two per cent silicon is gray forge or anything you may choose to call it. For any metal carrying less than two per cent silicon has no capacity for carrying even the sprues and foundry scrap. Much less can it carry cheap cast scrap which is so largely used. And when it is undertaken to carry any of this in a mix where this so-called No. 2 foundry, which has less than 2 per cent silicon, is used, there must be added enough high silicon pig, carrying from 6 to 8 per cent silicon, to make a good machinery casting. When this is done, the mix costs more than a good first-class No. 2 foundry which carries over 2.50 silicon. A new name has been given to No. 1 and No. 2 foundry iron which carries over 2.50 silicon. It is called a softener. But this new name adds no new virtue. It is the same metal, and the most economical softener is a ferro-silicon of from 8 to 10 per cent silicon.

In *The Iron Trade Review* of March 31, 1898, is an article by Charles W. Friend on "Furnace Facts about Foundry Iron," and as it so fully illustrates my thought on the subject of foundry iron I take the liberty of making use of its tables:

TABLE A, PURE PIG IRON.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9	No. 10
Silicon.....	1.15	1.50	1.60	1.80	2.00	2.25	2.50	2.60	2.80	3.00
Sulphur.....	.010	.011	.014	.016	.018	.016	.020	.024	.020	.022
Phosphor's	.60	.56	.58	.61	.55	.54	.61	.60	.51	.60
Manganese	.50	.52	.49	.45	.90	.50	.70	.45	.80	.35
Graph. Car.	3.00	3.10	3.20	3.40	3.00	3.70	3.30	3.80	3.50	3.70
Comb. Car..	.12	.35	.30	.25	.14	.12	.13	.16	.30	.06
Tensi'e Str.	16000	19000	15000	24000	18000	17000	18000	16000	15500	14500
Trans. Str..	1800	2100	1700	3000	1600	1700	2000	1500	1600	1400
Fluid	Flu.	Flu.	Flu.	Flu.	Flu.	Flu.	Flu.	Flu.	Flu.	Flu.
Soft.....	Soft.	Med	Soft.	Hard	Med.	Soft.	Soft.	Soft.	Med.	Soft.

TABLE B.

Same iron with 30 per cent good machinery scrap.

	No 1	No. 2	No. 3	No. 4	No. 5.	No. 6	No. 7.	No. 8	No. 9.	No 10
Softness.....	Soft	Med.	Soft.	Hard	Hard	Soft.	Med.	Soft.	Med.	Soft.
Fluidity....	Flu'd	Flu'd	Flu'd	Flu'd	Flu'd	Flu'd	Soft.	Flu'd	Flu'd	Flu'd

TABLE C.

Same iron with 60 per cent good machinery scrap.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10
Softness ..	Hard	Hard	Med.	Hard	Hard	Soft.	Soft.	Soft.	Med.	Soft.
Fluidity....	Flu'd	Flu'd	Flu'd	Flu'd	Flu'd	Flu'd	Flu'd	Flu'd	Flu'd	Flu'd

Nos. 1, 2, 3, 4 and 5, without an admixture of scrap, make a good soft medium casting, and Nos. 6, 7, 8, 9 and 10 make a good casting carrying 60 per cent scrap. But Nos. 1, 2, 3, 4 and 5 are too hard for good machine castings.

Grading pig iron according to its silicon contents does not necessarily make the price of the pig iron depend on it, for some grades of pig iron carrying the same amount of silicon may be considered more valuable because of the phosphorus or manganese they carry. For many special purposes a pig iron high in silicon, phosphorus and manganese and low in sulphur is more valuable than an ordinary iron carrying the same amount of silicon.

One of the many things for the foundrymen's associations to do is to institute a uniform grading of foundry pig iron, so that a number or name in one state is understood in any other, and numbers and names mean something which all foundrymen can know and understand, as well as furnacemen. I am confident the furnacemen are ready and willing to assist and coöperate with the foundrymen in establishing such a uniform method of grading.

Discussion.

Mr. Ferguson: Major McDowell states that "sulphur under no circumstances is to be considered; if possible, eliminate it." I know that in getting high mottled iron of great thickness, it is desirable to have sulphur to assist in the mottling of the iron. Every analysis taken from such iron as I speak of shows the sulphur high; and in trying to get the same mixture when the mottle is absent, the sulphur is low. This would lead me to believe that under some circumstances sulphur is essential. Major McDowell also says: "It is silicon that gives value to pig iron, and graphitic carbon is the evidence of its being in the metal, although silicon does exist in metal sometimes without a manifestation of graphitic carbon." Charcoal iron will run 1¼ or less in silicon with the total carbon of over four per cent. I would like to have the Major explain how he accounts for that if the silicon controls entirely.

Maj. McDowell: You must always take into consideration the circumstances. Charcoal pig is the exception; the rule is coke pig. What we want to get at is what gives the charac ter to iron and controls its price. A man comes to you and says, "This is a splendid quality of pig; see the graphitic carbon in it"—as though graphitic carbon makes the iron. It is simply the evidence of the presence of silicon. These two photographs illustrate two pigs sold as No. 1 foundry with the analysis guaranteed by one of the most prominent agencies. In unloading the car I broke one pig and I picked up that close piece. We broke every pig and made these two grades. I did not expect to see the close piece analyze as containing three per cent of silicon, but it did and it showed it in its work. I feel that there should be a standard way of grading pig iron. Pig iron is valuable to different persons in different ways, but when we come to grading it we want to know, when we say No. 2 iron, what we are getting. When you are buying tenpenny nails you know what you are getting. You cannot do that with pig iron. We do not want to regulate the prices. I used figures simply to illustrate. Mr. Ferguson said a moment ago that analyses are of no use to foundrymen until they are educated. What we want to do is to agitate these questions until we do get to know what we want. I have been in quite a large number of foundries all over this country and I have found a great ignorance upon the subject. The foundrymen do not know the constituents necessary in pig iron to make the iron they want. The salesman sells the iron hoping it will answer the purpose, and the foundryman does not know any better than to buy it and then there is trouble and complaint. I want a more intelligent way of buying and selling iron.

Mr. Ferguson: I certainly agree with the Major that the foundrymen do not know how to handle the various metalloids for their various requirements, and, as he says, by agitating the question we can gain a little knowledge. I still insist that it matters not to the foundryman whether his iron contains 2 or 2½ per cent of silicon unless he has the knowledge that enables him to control the silicon and other elements in the iron. I cannot get through me the matter of silicon being the controlling element in the value of pig iron. I know of an iron that carries 3½ silicon and 1½ manganese. It is in the market to-day and the foundrymen are using it. The other metalloids come into play.

Mr. McDowell: There are some elements that we know very little of to-day, as I have set forth in the beginning of my paper. Charcoal pig is a negative. It is what I would call an alkaline, while coke is an acid iron. You cannot do with coke pig what you can with charcoal pig. You say a great

many things can be done, and the next day you do something that knocks your theories higher than a kite. I undertook once to raise the combined carbon in the iron and instead of doing that I turned it all into graphitic carbon. Sometimes manganese will make combined carbon and sometimes graphitic carbon. We do not know when or how. There is another question—carbon's relation to iron as affected by manganese. Iron, by itself, can be saturated with carbon up to 4½ per cent; manganese can be added to strengthen it so that it will carry 7½ per cent; then add chromium, and it will carry 12½ per cent. One is a positive metal and the other is a negative metal. There is a point where silicon does not make itself manifest in the iron. It is the same way with manganese, and there is a point where it makes the best iron made. That point is between 1 and 1¼ per cent, free from other metals or metalloids to embarrass the result. One and one-quarter per cent silicon and one per cent manganese gives the best iron made, if it is not embarrassed by phosphorus and sulphur. The sulphur should never be over .025 in the pig. I would ask Mr. Ferguson what mottled iron is? What is the object in making mottled iron?

Mr. Ferguson: To give strength and density.

Maj. McDowell: How strong can you make mottled iron?

Mr. Ferguson: I do not know that I can answer that. You cannot test it by an ordinary test bar, but I have gone to the trouble to break a six inch square bar, 18 inches in the centers. It showed about 450,000 lbs. transverse strain. It pretty nearly broke the machine.

Maj. McDowell: We used to make mottled iron for chilled rolls. I have gone through the chilling process until I have eliminated sulphur entirely, and can make a stronger iron without sulphur than with it.

Mr. Moore: I can cite an instance in our own experience where we were fighting sulphur. At one time we downed it, and got some very low sulphur iron, getting our castings down to about .04 or .05. That is considerably below where we had gone previously, the range ordinarily being .06 to .07. The iron apparently was quite high in phosphorus and graphitic carbon. The result was that the castings were full of pin holes. We put in some scrap and brought the sulphur up to the normal point and the trouble disappeared. That is not conclusive evidence, but was our experience.

Maj. McDowell: A higher manganese would have corrected the trouble. Manganese intensifies iron's affinity for carbon, and eliminates the sulphur. We do not yet know to what extent we ought to use these, one against the other and to stimulate the other. If you add carbon to a metal it makes a hot metal. There is life to it. Carbon is the life of iron as well as of the individual.

Mr. Stantial: The Major has said what ten or twelve years ago any one would have said. He says that coke iron cannot be used for the purposes charcoal iron can be used. I would like to ask him one of these purposes.

Maj. McDowell: Chilled rolls. You cannot make chilled rolls out of coke iron, unless you produce a reaction in the cupola.

Mr. Stantial: Is that because of the state of the art?

Maj. McDowell: That is it. You will have to produce a reaction in the cupola similar to the blast furnace to make chilled rolls out of coke iron.

Mr. Stantial: Is it not a fact that chilled rolls are being made from coke iron to-day?

Maj. McDowell: Not to any extent. The largest manufacturer of chilled rolls in the country has never made them without using charcoal iron.

Mr. Stantial: Ten years ago no one thought malleable castings could be made from coke iron.

Maj. McDowell: There is a considerable difference in making malleable castings and making chilled rolls. What would do in one case would be entirely wrong in the other. I have had considerable correspondence as one of a committee appointed some time ago to ascertain the value of metalloids in connection with iron. I have tried to get some of the colleges to take it up, but have not been successful. I finally induced the State College of Pennsylvania to investigate the question, and they have asked the legislature to make an appropriation for the purpose. We only know to a very limited extent the value of the various metals and metalloids that combine with iron. We know very little of the value of the heat used in melting iron, as affecting the results. Some days we have a remarkable metal and a very remarkable heat. There are several things besides the metalloids that make the castings, and one of them, and a very important one, is the heat.

Mr. Moore: Speaking to the main point, as to the grading of iron by analysis and the determination of the value of the iron by the silicon it contains, it seems to me this would be feasible, provided there were enough in harmony with it. But I would suggest that there be two grades—two tables. The Major has submitted a table giving No. 1 foundry iron with three per cent silicon as a basis and dropping 25 cents a ton for each quarter point of silicon. Whatever value the quarter point may be, I would suggest another table for foundry iron with .03 in sulphur as a standard, or possibly .04, and for each point deduct 25 cents a ton. It is worth it. In purchasing iron I consider the cheapest way we can buy silicon is to buy high silicon iron. There is a difference between the market price of eight per cent silicon iron and No. 3 foundry iron of about $2 a ton. If you buy an iron which runs from 1 to 1½ per cent silicon, and buy eight per cent silicon iron at $2 per ton more, you can increase the silicon in the first iron by using the high silicon mix at an additional cost of about 30 cents a ton. If you buy foundry iron to equal that it will cost you possibly 50 cents a ton to get the mixture up to 2½ per cent silicon. I would like nothing better than to have this question fought out with the furnacemen. Reverting to the question of low sulphur, I take it that Maj. McDowell agrees with me that whereas sulphur did better than we thought it did, manganese would have been a much better agent for our purpose.

Maj. McDowell: A paper which I read here some time ago had a larger table with reference to grading iron, and referred to the amount of sulphur that would be permissible, and when it exceeded that amount there would be a reduction in the price of the iron.

Mr. Coffeen: There is one question I would like to ask the Major. In grading foundry iron do you think it necessary to take into account the amount of carbon, or do you think you can control the carbon in controlling the other elements? Mr. B. S. Summers had an article in *The Iron Trade Review* recently which dealt somewhat with this question, and a short time ago I asked him about it. He attaches a good deal of importance to the amount of graphitic carbon in the pig iron.

Maj. McDowell: Carbon in iron is valuable in proportion to the amount contained and its relation to the iron.

Mr. Chamberlain: One thing mentioned here set me to thinking. In speaking of technical schools taking up this question of analysis of iron and mixtures, it strikes me that it can scarcely be done by the schools, except at very great outlay, as it is very difficult to get in laboratory work the actual conditions which you will find in foundries. From that point of view it seems to me that the data must necessarily come from the foundries. If the combined knowledge of foundrymen could be tabulated it would be a fund of data invaluable in drawing conclusions. If the analysis of the pig and scrap, the fuel, and the product, the physical test, the temperature of the furnace and of the iron as it was run, the nature of the sand, and the proportions of oxygen supplied to the blast, were all taken close account of, it seems to me that there would be no trouble in reproducing any heat. I think the greatest advance in the subject of foundry practice is going to come from the data furnished by the foundrymen themselves, and the greater the amount of exact data procurable the greater the good to be obtained. The old tendency of the arts to keep secret that which was learned to be superior is rapidly passing away, as is evidenced by this society and other societies, which are composed of men interested almost entirely in the dollars. It is not love of science which brings these men together to discuss the arts, but the interest in the gain of dollars. It seems to me that if some method could be devised for reporting the results of various heats a great deal of valuable data could be formulated to aid in further developments.

The meeting then adjourned.

It is reported that the Ross Meehan Brake Shoe Co., of Chattanooga, Tenn., has acquired the plant of the Chattanooga Car & Foundry Co. There is some talk of embarking in car manufacturing.

THE TIN PLATE COMBINE.

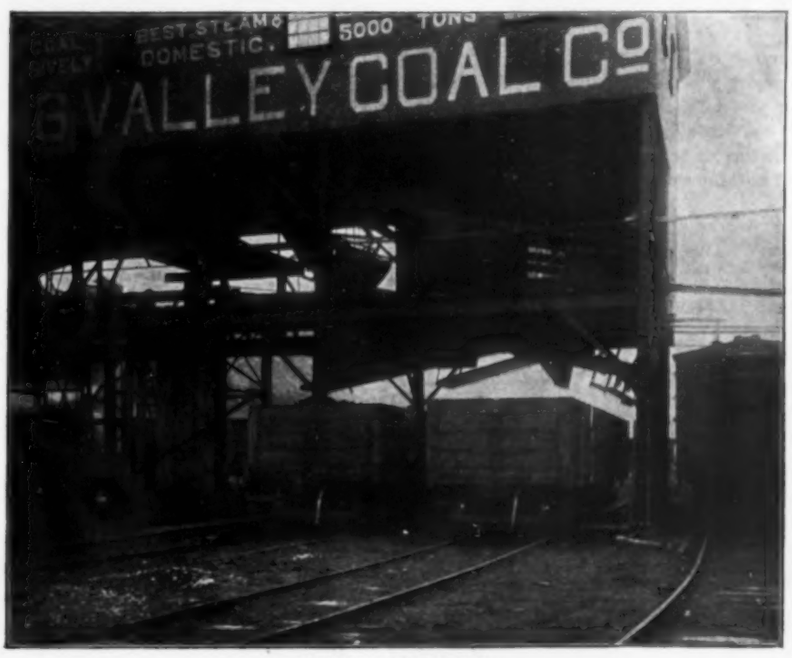
Some interesting considerations in connection with the tin plate consolidation are presented by *Tin and Terne*:—

"The statement is positively made, and as positively denied, that every tin plate manufacturer in the United States has taken stock in the new company in exchange for his plant. That the tin plate manufacturers should be willing to sell their plants for an amount of cash rather in excess of their value, as would be shown by a proper and conservative system of book-keeeing, is a credible proposition, in view of the close competition and shrinkage of profits which has occurred in the last year or two. That they should willingly and even anxiously subscribe for stock in the consolidated company, in lieu of cash, when the company is capitalized at a rather high figure, does not seem so natural. Six weeks ago it was given out that more than double the amount of cash necessary to put the deal through had been subscribed by outside parties, and this was when it was expected that the tin plate makers would all demand cash in exchange for their plants. Now it is given out that they have asked for stock instead and the promoters, who were to take the stock themselves, have kindly conceded the point. . . .

"The options are said to aggregate $12,000,000. Between $4,000,000 and $5,000,000 will be required for working capital. Various prices are being paid for the mills, according to location, equipment, etc. The number of mills taken in cannot exceed about 290, and may be decidedly under this figure. This would be a trifle over $40,000 per hot mill. It must be remembered that this does not include any stock whatever. As high as $50,000 per mill was paid in a few cases, with others correspondingly below the average. . . .

"Regarding the management and policy of the company which is to be formed nothing whatever has been given out authoritatively. It is said the price will be advanced to $2.80 for 100-lb. coke plates, Pittsburg or Indiana mill, and while this is a stiff advance, it is not a radical one. It is claimed that no consolidation has ever been formed which has been so perfectly arranged down to the minutest detail, both in the formation and in the future operation. It is asserted that all interests will be fully taken care of and harmonized. It is regrettable that some at least of the plans are not given out, as they would certainly be very interesting. It would be interesting to know, for example, how the present distributors of the bulk of the tin plate production can be taken care of by assuring them a good profit on the tin plate they handle, and at the same time not have the advanced price to consumers stimulate them to build plants of their own. It would be interesting also to know how the consolidated company can buy their rolls and other castings cheaply from the foundries and at the same time keep them in line so that they will not encourage the erection of new plants. With the present surplus in tin bar productive capacity it would be interesting to know how the trust's orders are to be divided up so as to satisfy all the producers and keep them from working up their product themselves. Statements have been made that profits are to be reckoned on an output of 8,000,000 boxes a year. As the total consumption, including domestic consumption and the consumption of drawback plates, has thus far been considerably less than this, it would be interesting to know how it can be increased with higher prices, and how a profit can be figured on the whole amount, when the drawback trade can only be won by producing at a loss. If this is not done, some of the plants must be shut down to ensure economical operation of the rest, and it would in this case be interesting to know how the men are to be prevented from building co-operative plants, by adding to their earnings the assistance of towns seeking industries, foundries seeking orders, and outside capital seeking investment. The manufacture of light sheets has been an important part of the tin plate mills' work, but will certain'y have to be abandoned if there is any hope of keeping the sheet mills out of the tin plate trade proper. The answer to this problem would be very interesting.

"It may be that the announcement of the real plans of the inchoate company, which it is to be hoped will be given out some time, will answer all these questions in the most satisfactory way, but in the meantime there will be doubters."



SHAKING COAL SCREEN.

SHAKING COAL SCREEN.

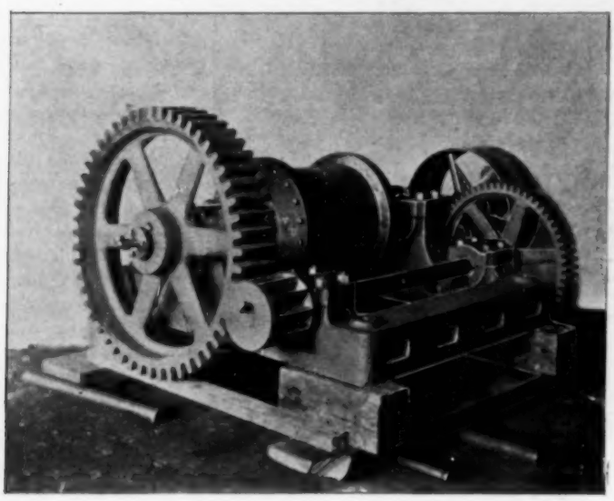
The accompanying illustration is a partial view of the steel tipple building at the No. 1 shaft of the Spring Valley Coal Co, Spring Valley, Ill., and shows what is probably the most perfect arrangement at present in use for weighing and screening bituminous coal at a mine. It consists of a steam-operated weigh-box and a pair of shaking screens. The shaking screens are arranged to make four different sizes of coal, delivering them either severally, or in various combinations, to cars on the four tracks shown. As the lump coal at this mine is very largely loaded into box cars on the outer track, a special apron has been fitted to the end of the screen in such a way that it can be quickly and easily removed from or entered into a box car, or adjusted to load an open car. To do this only requires as long as is required in the case of a box car to enter the reciprocating box car loader used at this place, or in the case of the open car, to bring the car into position under the apron. The entire apparatus has a capacity for weighing and screening four pit cars per minute, and was invented, built and erected in running order, by the Link-Belt Machinery Co., of Chicago. The entire equipment, including screening and loading arrangements, the steel tipple buildings, hoisting engines, capell fans, shaft bottom, and in fact everything about the place, is of the best that can be obtained.

HEAVY DROP HAMMER AND LIFT.

The accompanying illustrations are of a special form of extremely heavy drop hammer, with water cooling device for lifting arrangement. The hammer and uprights are of steel castings, the hammer weighing 4,500 lbs. The anvil is provided with six forged poppets of a special grade of material to prevent crystallization, each poppet being provided with a cast steel tempered set screw for adjustment. The poppets are securely keyed in position. This makes an excellent arrangement for holding large dies.

The lifting device is of improved design, and is arranged to have a continuous stream of water running through the drum, thereby keeping the drum perfectly cool and preventing friction of the rope. This reduces the breakage or wearing of the rope to a minimum, and where an inexpensive lift is required, is of advantage.

These machines are made in various sizes to accommodate the work required of them, and can be provided with positive automatic lifts. For ceiling, cornice and agricultural work, the machine is especially effective. The complete weight is 27,500 lbs. The manufacturers are the Toledo Machine & Tool Co., Toledo, O.



HEAVY DROP HAMMER AND LIFT.

POINTS IN BENCH MOLDING.

Many of the articles found on the shelves of our hardware stores show what is possible with first-class molding; the castings fitting together perfectly, and the price of the articles usually showing that but little labor has been expended in making the parts go together.

One fault often found in light work is that it is not true to pattern, being either warped or too heavy. This is mostly due to carelessness or ignorance on the part of the molder, who pounds away without thinking. Where a match is provided, it is permissible to ram the drag portion of the mold pretty solid; in fact, this part should always be rammed harder than the cope. I know that this is opposite to the theories of many, but when we consider the frailty of the average pattern, or gate of patterns, molded on the bench, it may perhaps appear that there is a grain of truth in my reasoning. While ramming up the drag the pattern is supported by the match or follow-board, which furnishes a solid foundation against the pressure of the rammer. Uneven ramming at this stage will not distort the pattern, as it is firmly supported by the follow-board. When the drag is rolled over it, in turn becomse the sole support of the pattern, and it must be evident that we cannot ram the cope harder than the drag without disturbing the original outline of the latter, and, if this is done, the light pattern will more or less follow such depression, with the result of giving somebody something to look after. What is commonly called "straining" in light work is nothing but the mold being rammed out of shape and the pattern following suit. Much of this can be laid to the injudicious use of the shovel handle. Now I am not speaking against the use of the shovel handle for this purpose, if it is used right. The trouble is that some molders will go around the edge of the flask carefully when ramming up the drag, and when they come to the cope will sail in for all they are worth, because they know that the cope must be rammed hard enough to stand lifting off. If they would ram their drags solid enough to withstand the pounding they are doing on the cope, warped and thick castings would become scarce. The thick casting thus produced is ometimes mistaken for a "swelled" casting, and the molders has the riot act read to him for not ramming his molds hard enough, when the opposite is really the true cause of the defect. He may even start in to remedy things by ramming the mold harder all around, but unless he rams even, and rams the drag sufficiently to withstand the ramming of the cope, the pattern will spring more or less, and the castings will not be of equal thickness.

Another cause of small castings not being true to pattern is found in the indiscriminate use of the draw plug. When a molder has been working on heavy patterns for some time, where he has been able to drive a draw-plug in hard without any apparent evil effects, he is likely to proceed in the same manner on the light pattern. No great force should ever be used on any pattern where it is desired to obtain true castings. A draw-plug made of hardwood and split at the point will, when inserted in the drawhole by the simple pressure of the hand, hold securely, without the addition of any injurious pounding. Thumping on the draw-plug with the rapping bar will naturally not only drive the pattern downward, but with light patterns a further disarrangement of original lines will result from the vibration caused by the careless tightening of the draw-plug.

As molds made with a snap flask have nothing to support them except the weight that is "shifted" upon them, it follows that this weight must be perfectly flat, so that it may bear with even pressure upon all parts of the mold. It also follows that the strike-off must be straight, and not warped, bent or worn out of true. The top of the flasks must also be kept in perfect condition to obtain perfect castings. Once, after I had worked a long time on the floor, I got a bench job, where some of the molds would strain regularly, yet

scattered enough to be puzzling. At first I blamed myself for the trouble, thinking that it was caused by my not being "onto" the way of pouring with the hand ladle. I examined the flask and strike-off, both of which were straight. In shaking out one day I noticed that only one row of molds showed the familiar fin, and upon putting a straight-edge across the face of the weights I found one which was about an eighth of an inch hollow in the center. That explained the trouble. These weights were made from a straight pattern, and face down besides, yet unequal contraction had drawn them out of shape, and only after they had been planed off did strained castings disappear altogether. As molders we are apt to say it is only a sixteenth or a thirty-second, when we get that far we are getting to the end of our terms of measurements. We lack the machinist's exactness. If we would measure as far as a "thickness of paper" it would be better for us.

When a mold is made in a flask and cast in the same it is supported thereby and also by the bars it contains. A piece of pig iron laid on the edges will answer as well as the same amount of iron made into a flat weight. But remove the flasks, as in snap flask work, and conditions are altered. In pouring the mold the cope will be forced upward until it meets the surface of the weight, and then somebody will likely suggest that it was poured "too hard." An examination of flasks, strike-offs and weights generally show that it is something else.

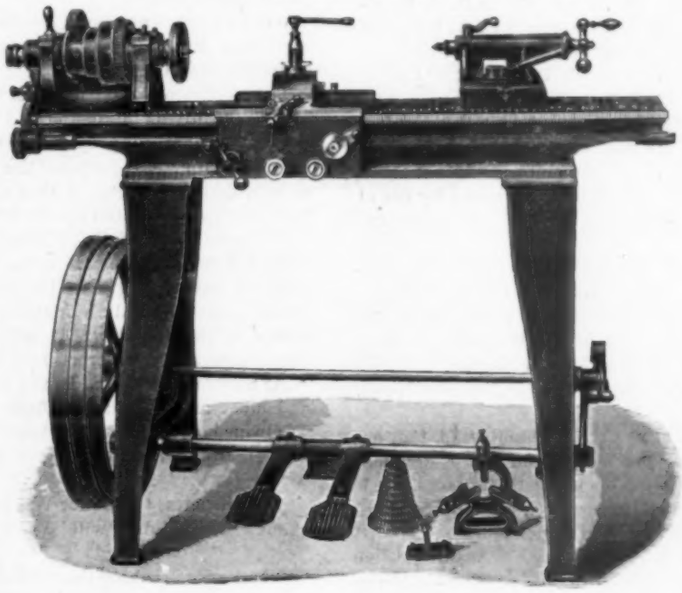
Weak bottom-boards, especially if set upon an uneven floor, will also cause castings to be of an unequal thickness, although the mold may give no outward indication thereof. When the weight is placed thereon, however, it bears unevenly. I know the molder should level his floor up, but in the rush of everyday bench molding I believe I would sooner rely on good heavy bottom-boards.

Much is said in regard to gating in ordinary foundry practice. With bench work this is a question that cannot be decided on paper. So much depends upon the shape of the casting, and upon what portions of it must be most perfect, that this matter is wholly outside of the sphere of "prescription." Generally speaking, light work is gated where this will do the least damage. Many castings are used just as they come from the sand, without grinding of any kind, simply through following this rule.

Light castings, when wanted perfect, are not so easy to produce as some of the heavy-weight molders would have us believe. Of course, it is about as easy to produce perfect work as shabby, when once the way is found. What I mean to say is that there are difficulties in the way of turning out light work just as well as with the heavier castings. No man needs to leave small work in order to show his ability, and this is as true in the foundry as in any other place.—[Henry Hausen in American Machinist.

FOOT POWER SCREW CUTTING LATHE.

A new pattern of screw cutting engine lathe for foot power has been brought out by W. P. Davis, of Rochester, N.Y., and the accompanying cut shows its general features. It has automatic cross feed and thrust ball bearing, with crank shaft roller bearing and hollow spindle. This lathe is a close copy of the larger sizes of the same maker, except that the bed pattern is webbed under at the ends to allow the driving pulley to be placed outside of the leg. The foot-power lathe is designed especially for tool room work, and for industrial, military and navy schools. The length of bed is 54 inches; the swing 10 inches. The weight is 550 pounds. The dimensions, which are as follows, will indicate relatively the strength and driving power of the tool: the front bearing is 2¼ inches long and 1¼ inches in diameter; back bearing, 1⅞ inches long and 1¼ inches in diameter. The nose of the spindle is 1¼ inches in diameter; 10 threads to the inch. The hole in the spindle is $\frac{9}{16}$ inch and conforms to Morse Taper. Swing over ways, 10¼ inches; swing over rest, 7 inches. Distance between centers, 32½ inches. The cone has three sections: 3¼, 4⅜, 5½; face, 1⅜.



FOOT-POWER SCREW CUTTING LATHE.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants :—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

B. B. Quillen, vice-president and general manager of the American Tool Works, Cincinnati, has resigned and withdrawn from that organization in which for so many years he has done valuable service. He has formed a partnership with W. H. Burtner, also hitherto an official of the same company, the new firm to be known as the Cincinnati Planer Co. Their plant will be at Harrison ave. and Buck st.—a brick building 120 x 80 feet, fitted with cranes and a full equipment of tools.

Bids will be received at the Bureau of Yards and Docks, Washington, D. C., until Nov. 26, for boilers for the navy yard at Boston. Specifications and blank forms may be had by addressing the commandant of the United States Navy Yard, at Boston.

Some new boilers will be installed at the Brooklyn Navy Yard, and bids will be received until Nov. 26 at the Bureau of Yards and Docks, Navy Department, Washinotn, D. C.

Plans are under consideration for the establishment of a plant at Chicago for the manufacture of steel cables and the machinery used in building and operation of tramways. Geo. T. Gaden, of San Francisco, Cal., is in Chicago at present, making arrangements for the promotion of the company. The plant, if built, will be used principally for the manufacture of appliances invented by Mr. Hallidie, of San Francisco. These

appliances are in use in many of the cable railways of the country.

It is stated that Ohio parties have been corresponding with the mayor of Maysville Ky., relative to the establishment of a rolling mill and horseshoe factory in Maysville; proposed plant to cost $100,000 if located.

Black Brothers' Machinery Co., principal office Chicago, capital $50,000, has been incorporated by Walter Black, William Black and David Black.

The Taylor Machine Co., of New York, has been incorporated with $75,000 capital. Directors, J. T. Nelson, C. B. Lambert, I. S. Sarmer,

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New Construction:—

The newly erected plant of the Michigan Malleable Iron Co., in Delray, Detroit's suburb, is about to be put in operation. The buildings cover practically 600 x 600 feet, six acres of ground being occupied. Electricity from the company's own plant will furnish power.

G. W. Drach, Mitchell building, Springfield, O., has prepared plans for a two-story brick factory for the Safety Emery Wheel Co., to be 25 x 100 feet, and to cost $9,000.

The St. Joseph Iron Works, St. Joseph, Michigan, is building brick structures, 45 x 62 feet, two stories, 55 x 62 feet, and 50 x 80 feet, for machine shop, foundry and engine room.

Plans for the new plant of the Schoen Pressed Steel Co., of Pittsburg, will double its capacity. The company is now building 20 cars a day and within a month will be manufacturing 35 cars a day. Work will begin at once on a plant which will add 40 cars a day to this capacity.

The plant of the Franklin Mfg. Co., destroyed by fire at Franklin, Pa., Nov. 5, was insured for $13,000. It is expected the plant will be rebuilt.

The Brier Hill Iron & Coal Co., Youngstown, O., has completed its plant for making cement from blast furnace slag.

The Niles (O.) Mfg. Co. has contracted to build a steel coal tipple and coal hoisting plant for Arnold Ridge No. 2 mine, above Fayette City, of the Johnson Coal Mining Co.

Work of excavating for the new dry dock at Newport News, Va., has begun.

The Phœnix Iron & Bridge Co., of Phœnixville, Pa., announces that the capacity of the steel plant will be doubled. The plant now has four 40-ton open-hearth furnaces. It is stated that the contemplated increase in furnace capacity will lessen the cost of producing steel $1 per ton.

The Damascus Bronze Co., Pittsburg, is making some changes to its plant in Allegheny. Some wooden buildings are being replaced with steel buildings, which will be used for stock bins, warehouse and pattern storage.

The Shiffler Bridge Co., Pittsburg, has just received the contract for the steel buildings required for the basic open-hearth steel plant being erected by the Alabama Steel & Ship Building Co. at Ensley, Ala. The plant is to contain ten 50-ton basic open-hearth steel melting furnaces, with blooming mill, etc. The mill building will be 349 x 51 feet, having along one side a boiler house 209 feet long, engine house 60 feet long and power house 80 feet long, all 36 feet wide. Across the end of the mill building, making a T, will be the furnace building, 140 x 51 feet. Extending out from the furnace building on the side opposite the mill building will be two separate buildings containing the continuous heating furnaces, each of these buildings being 100 x 20 feet, with an open space between. Separated some distance from this group of buildings, which will all be under practically one roof, will be the machine shop, 100 x 54 feet. The buildings will be all steel construction, with corrugated iron covering. About 500 tons of structural material will be required.

At Covington, Tenn., a machine shop is being built by Chas. H. Hill.

The Schreiber & Conchar Mfg. Co., Dubuque, Ia., will erect a foundry. Heretofore its castings have been made on contract.

The new bridge just erected for the town of Bridgeton, Me., has a clear span of 36 feet, a roadway 22 feet wide and a sidewalk 6 feet wide. It is of steel throughout except the floor plank, having latticed girder trusses and steel beams for the floor. The Berlin Iron Bridge Co., of East Berlin, Conn., had the contract for furnishing and erecting the bridge.

The McCormick Mfg. Co., of Des Moines, Ia., expects to have its new plant completed by Dec. 15. It will cover 1½ acres of ground, practically that space having been roofed over. The company bought what was left, after a fire, of the plant and machinery of the Des Moines Fence Co., and further machinery has been purchased which is now on the way. The new company will be the largest manufacturer in the West of lawn swings and lawn settees. Its products will include also corn cribs, wood and wire fences, and on a large scale the manufacture of shoveling boards will be carried on. Excelsior will also be manufactured extensively.

The Niles Tool Works, at Hamilton, O., will erect a new building 70 x 200 feet in size.

Matt McDermott, proprietor of the Ohio Valley Tool Works at Martins Ferry, O., will start a branch works at Woodsfield, O.

The Connersville (Ind.) Blower Co. has awarded to the New Castle (Ind.) Bridge Co. the contract for a new steel addition, 60 x 60 feet, to the foundry.

At Middleville, Mich., the new building of the Keeler Brass Co. is enclosed and machinery is being put in place.

It is reported that the Dennison (O.) Rolling Mill Co. has decided to double the present capacity and will expend $50,000 in improvements.

Work on the erection of a roundhouse and repair shops for the Union Railroad has been begun at Munhall, Pa., by the Carnegie Steel Co., Ltd.

The Addyston Pipe & Steel Co., of Cincinnati, O., whose pipe foundries at Addyston and Newport, Ky., are in operation, states that it is proposed to build a new plant at Birmingham, and for that purpose the president of the company is now investigating sites at that city. Export as well as home trade will be cultivated by the Birmingham plant.

Williams, White & Co., Moline, Ill., now have their foundry rebuilt after the fire. It is 240 feet long, with cranes covering the entire length. The company is putting an electric motor on a crane and also putting up a new 15-ton three-motor crane in the foundry. It will also instal a crane of the same capacity in the erecting department.

At San Antonio, Tex., Henry Guenther will build a foundry in connection with his machine shop. In addition, the plant at Owensboro, Ky., will be kept in operation.

J. H. Brandel is building a new boiler plant at Owosso, Mich.

The Marietta, O., Boiler Works will build an addition to its plant. One building will be 50 x 176 feet, and another 48 x 95 feet.

The Fence Machine Co., of Kokomo, Ind., has built an addition 30 x 90 feet and is adding new machinery.

An addition 30 x 65 feet is being erected by the Geneva Tool Co., Geneva, O.

An addition is being erected at the Geiser machine shops, Waynesboro, Pa.

At Gadsden, Ala., the Hoffman, Billings & Weller Pipe Works have purchased land 50 x 253 feet, giving them four acres. A two-story cleaning department 35 x 70 feet has been begun.

At Bowling Green, O., the American Foundry & Machine Works will build an addition 60 x 80 feet to its molding room

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Fires and Accidents:—

Fire in the forging department of the Pillow & Hersey Bolt & Nut Works, Montreal, Nov. 11, caused considerable loss.

The Syracuse Malleable Iron Works, Syracuse, N. Y., owned by Willis B. Burns, were damaged $10,000 by fire Nov. 17. Insured.

Christian Mayer's machine shop at Millersville, Pa., was nearly destroyed by fire due to the explosion of a gasoline tank, Nov. 16. Loss, $2,000.

At Erie, Pa., Nov. 21, fire caused $10,000 damage to the Chicago & Erie Stove Co.'s works. Partly covered by insurance.

General Industrial Notes:—

The Eagle Iron & Steel Co., Ironton, O., will increase the capacity of its muck mill. A new furnace for the bar and guide mills is completed.

The Carnegie Steel Co., Ltd., will remodel its two Carrie furnaces at Rankin, Pa., and bring them up to about the standard of capacity of the other Carnegie furnaces. The

This Letter Should Interest Many People:

SAN ANTONIO STREET RAILWAY COMPANY,
SAN ANTONIO, TEXAS.
W. H. WEISS, ... President.

MR. JOHN G. HUNTER, Dallas, Texas. August 30, 1898.

Dear Sir:—We are pleased to be able to tell you that the 700 h. p. Cochrane Exhaust Heater sold us about six months ago, has been in continuous use since installed, and with very satisfactory results, both in freeing our feed-water from lime and magnesia, with which it is heavily impregnated, as well as the saving in fuel secured through its use. We have no difficulty in heating our water to 200° F., taking the exhaust from two pumps; when we use three or more pumps we carry the heat at 210° F. with the greatest ease. Moreover, we find that by its use our boiler capacity is materially increased. So far as our experience goes, the apparatus is mechanically perfect, and we cheerfully recommend it to all steam users.

Yours truly, (Signed) W. H. WEISS, President.

The Cochrane Heaters are made by THE HARRISON SAFETY BOILER WORKS, Philadelphia, Pa.

plans embrace relining, increasing blowing capacity, etc. Only one furnace will be taken out of blast at a time, No. 1 being attended to first.

The McCool Tube Co., Beaver Falls, Pa., put in operation several additional tube drawing machines last week.

The Rich Patch Iron & Ore Co. (a corporation existing under West Virginia laws) has purchased for $500,000 the mines and furnace property of the Rich Patch Iron Co., Covington, Eng. The new owner intends to extensively develop the property, open new mines, construct a new furnace, and put the present furnace in blast.

J. Craig McClanahan, of West Point, Tenn., has purchased for $30,000 the Spathite Furnace at Florence, Ala.; 1,100 acres of mineral land in Wayne Co., Tenn.; 375 acres of mineral lands in Lawrence Co., Tenn., and rights on 3,300 acres of mineral lands in Lawrence Co.

The Hercules Pipe Co. (formed by Edmund L. Tyler & Co.) has purchased the old bloomery plant at Anniston, Ala. The new owner will refit the works for the production of pipe, and plans are now being prepared for the alterations by Charles M. Noble. An additional building 30 x 60 feet will be erected.

At the New York office of the American Steel Foundry Co., in the Havemeyer Building, there are on exhibition a few pitchers with a capacity of about three quarts each, which were pressed cold into the form in which they are shown. The ingot from which the steel casting had been made was rolled into a bar at the Granite City Steel Works, then into sheets at the Granite Iron Rolling Mills, and was pressed cold at the works of the St. Louis Stamping Co. from a casting made by the American Steel Foundry Co. About 100 of these pitchers were pressed cold without a breakage, which would lead one to believe that the art of casting steel has been brought very near a point of perfection. The metal used in pressing these articles is the same as is used for the bolsters and castings made by the American Steel Foundry Co.

The recent purchase of the Alabama Steel Co.'s two furnaces at Fort Payne, Ala., by individuals, was made for the Birmingham Rolling Mill Co., of Birmingham, and the plants will be put in operation at once.

The New Albany Mfg. Co., New Albany, Ind., is considering the opening of the old American foundry at that place, its present foundry capacity being inadequate.

At a meeting of Otis Steel Co. debenture holders in London recently, Jeremiah Head, managing director, who presided, said: "The capacity of the works in the year ended June 30, 1897, was in excess of the orders obtainable, while in the year just ended good orders were day by day declined because delivery could not be given within a reasonable time. The accounts for the year ended June 30 last showed a gross profit of £7,623 and a net profit of £1,804, as compared with a loss of £7,209 in the previous year."

The Edgar Thomson Steel Works, which were shut down last week for the placing of new equipment, started again Sunday night, Nov. 20. The improvements made—the new engine, new blooming mill rolls, new shear, etc.—will make the capacity of the mill 100 tons of steel an hour.

The Rarig Engineering Co., Columbus, O., is completing the first shipment of 12-inch spring mortar carriages for the Government. This is a part of the order received for 10 carriages. The Corliss engine department is running double time upon several contracts for Eastern parties. The company has just made a shipment of 400 h. p. boilers for the Cumberland (Md.) Tin Plate Co. The structural department is completing a Franklin Co., O., contract for 500 tons of girder bridge work and has contracts for a large amount of highway bridge work to go outside the State.

Efforts are being made to form a company at Mt. Gilead, O., by E. G. Rippel and others to operate the plant formerly controlled by the Rippel Mfg. Co.

The *Railroad Gazette* announces that the Boston & Albany has asked bids on 300 box cars; that Armour & Co. will order 200 cars for carrying beef and 1,000 fruit cars; that the Wisconsin Central is about ordering 1,000 box, 250 flat and 100 furniture cars; that the Continental Fruit Express has increased to 500 its order with the Wells & French Co.; that

The Q & C Shop Saws

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No. 4. " 8 "
No. 8. " 3x12 "

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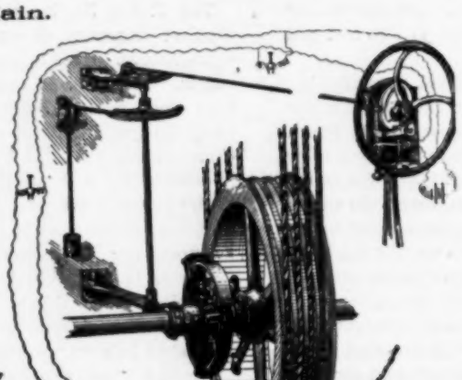

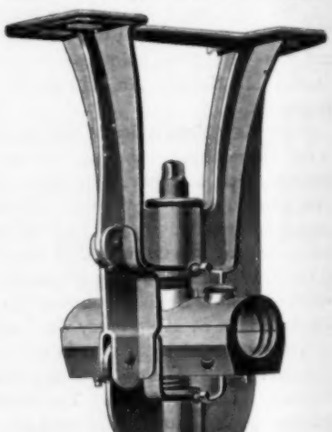

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the Kansas City, Pittsburg & Gulf needs 1,500 box cars, according to the report of the president, who recommends $2,500,000 equipment bonds; that the C. L. & W. has ordered 125 coal cars; that the Pennsylvania is building at Ft. Wayne 178 gondola cars and 150 box cars. The Maine Central and the Southern Pacific will buy more locomotives. The St. Louis, Peoria & Northern is preparing specifications for 30. The Canadian Pacific has placed orders for 25. The B. R. & P. is adding weekly to its recent order for 10 engines.

The Westinghouse Electric & Mfg. Co. has orders on hand for 262 electric railway motors and eight generators for British tramway companies and municipalities.

The Cincinnati (O.) Architectural Iron Works Co. assigned Nov. 18. Assets, $20,000; liabilities, $65,000. Bad contracts are given as the cause. The company was organized about ten years ago.

The Crescent Foundry & Construction Co.'s plant at Allegheny, has been purchased by the Consolidated Gas Co. The buildings will be torn down and the ground used for a steel tank. The Crescent company is looking for a site for a new plant.

The two plants of the Lebanon Boiler, Foundry & Machine Co., of Lebanon, Pa., will be sold at public sale on Dec. 6. It is reported that Wm. G. Miller, of the Pennsylvania Steel Co., is at the head of a syndicate to purchase the plant.

The Standard Steel Works are making an extension to their open hearth plant at Burnham, Pa., by putting in a new 15-ton Wellman rolling furnace.

It is now reported that the American Steel & Wire Co. has

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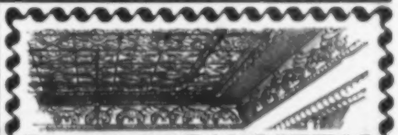

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MANUFACTURERS OF

Bessemer Pig Iron, Steel Billets, Blooms, Black Plate, Tin Plate, Tin Plate Bars, Wire Rods, Market Wire and Wire Nails.

purchased the plant of the McMullen Woven Wire Fence Co., at Evanston, Ill. The latter company has a capitalization of $200,000.

Bessie Furnace, at New Straitsville, O., resumed a few weeks ago after being idle for several years. The workmen have now given Miller, Wagoner & Fieser, the company operating the furnace, notice of a demand for 20 to 30 cents a day advance, and the company have banked the furnace for an indefinite period.

The Philadelphia Furnace, located at Florence, Ala., has been sold to Eugene Zimmerman, of Cincinnati, and B. F. Nichols, of Bessemer, for $100,000. The furnace has been idle for the past three years. It will blow in as soon as possible. The property was owned under a mortgage by the bondholders of the Florence Cotton & Iron Co., in Philadelphia. The new owners have options and mineral rights on ore lands in Alabama and Tennessee.

Robt. Wetherell & Co., Chester, Pa., have secured the contract for equipping the new power houes of the Franklin (Pa.) Steel Casting Co., consisting of engine, Berry boilers, and electric plant.

An effort is being made to form a company and raise $75,000 to start up the big plant of the Memphis (Tenn.) Car & Foundry Co. It cost $300,000 and was sold a year ago for $30,000.

The Pennsylvania Steel Co. has on its pay roll 6,000 men, and the prospects for winter work are reported good.

The Wais & Roos Punch & Shear Co., Cincinnati, O. has recently shipped a large doubler to the Dresden (O.) Iron & Steel Co.; one doubler to the Ætna-Standard Iron & Steel Co., Bridgeport, O.; one tin mill shear to Apollo Iron & Steel Co., Vandergrift, Pa., and one shear to Laughlin Nail Co., Wheeling, W. Va.

It is estimated that 150,000 tons of pig iron and cast iron pipe was shipped out of the Birmingham district in the month of October.

The Standard Automatic Gas Engine Co., Oil City, Pa., has been making good progress with the development of its enterprise. A number of engines are completed ready for shipment.

Testimony is being taken at Reading, Pa., in a $20,000 damage suit brought by the National Bolt & Nut Works against the city. The company claims that the construction of an intercepting sewer through its property made it impossible to use the ground for a new rolling mill, as intended.

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